

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

一、選擇題：(100 分，每題 5 分)

- 1) What is synthesis of RNA from a DNA template called? (A) Transformation (B) Reverse transcription (C) Transcription (D) Translation (E) None of these choices
- 2) Which of the following is a structural feature of DNA but not RNA? (A) Single-stranded (B) Containing the nitrogenous base adenine (C) Containing phosphate groups (D) Containing deoxyribose sugars (E) Containing the nitrogenous base uracil
- 3) What enzyme separates strands of DNA during DNA replication to make DNA single-stranded so it can be copied? (A) DNA primase (B) DNA polymerase (C) DNA helicase (D) DNA ligase (E) Reverse transcriptase
- 4) \_\_\_\_\_ is the enzyme that copies DNA during DNA replication. Thermostabile forms of this enzyme are essential for PCR. (A) RNA polymerase (B) DNA ligase (C) DNA polymerase (D) RNA primase (E) DNA helicase
- 5) Which of the following enzymes is a component of the large ribosomal subunit and catalyzes the formation of peptide bonds between an amino acid attached to a peptidyl-tRNA and an amino acid from an aminoacyl-tRNA? (A) Reverse transcriptase (B) DNA polymerase (C) Peptidyl transferase (D) DNA ligase (E)  $\beta$ -galactosidase
- 6) \_\_\_\_\_ bind to mRNA and tRNA during translation and allow for polypeptides to be synthesized. (A) Chloroplasts (B) Ribosomes (C) Nuclei (D) RNA polymerases (E) Chromosomes
- 7) Which type of base-pair substitution mutation has no effect on the amino acid sequence of a protein? (A) Missense mutation (B) Nonsense mutation (C) Silent mutation (D) Frameshift mutation (E) None of these choices
- 8) Which organelles form the site of ATP production by aerobic cellular respiration? (A) Lysosomes (B) Mitochondria (C) Ribosomes (D) Golgi (E) Rough endoplasmic reticulum
- 9) In a nucleotide of DNA, which carbon of the deoxyribose sugar binds to the base? (A) 1' (B) 2' (C) 3' (D) 4' (E) 5'
- 10) Nonprotein coding pieces of pre-mRNA that are removed during RNA splicing are called \_\_\_\_\_. (A) introns (B) exons (C) SNPs (D) promoters (E) poly(A) tails
- 11) Subtle differences in DNA sequences that vary from person to person are called \_\_\_\_\_. (A) genomics (B) chromosomes (C) DNA microarrays (D) pharmacogenomics (E) single-nucleotide polymorphisms
- 12) Which of the following is activated by phosphorylation? (A) Glycogen synthase (B) Acetyl CoA carboxylase (C) HMG CoA reductase (D) Mitogen-activated protein kinase (E) Hexokinase
- 13) Which of the following metabolic process occurs in the mitochondria? (A) Cholesterol synthesis (B) Fatty acid synthesis (C) Glycolysis (D) Fatty acid  $\beta$ -oxidation (E) Pentose phosphate pathway
- 14) Which of the following chromosomal changes is NOT responsible for position-effect variegation of a gene? (A) Transposition (B) Translocation (C) Inversion (D) Polyploidization (E) Deletion

- 15) In glycoproteins, the carbohydrate moiety always gets attached through which of the following amino acids? (A) Glycine or alanine (B) Glutamine or arginine (C) Aspartate or glutamate (D) Tryptophan or phenylalanine (E) Asparagine, serine, or threonine
- 16) The most definitive method for determining if actin is a component of an isolated membrane preparation would be to analyze the membrane proteins by (A) thin-layer chromatography (B) polyacrylamide gel electrophoresis (C) column chromatography (D) ultracentrifugation (E) Western blot (immunoblot)
- 17) Which of the following sequences correctly portrays the flow of electrons during photosynthesis? (A)  $\text{NADPH} \rightarrow \text{O}_2 \rightarrow \text{CO}_2$  (B)  $\text{NADPH} \rightarrow \text{chlorophyll} \rightarrow \text{Calvin cycle}$  (C)  $\text{NADPH} \rightarrow \text{electron transport chain} \rightarrow \text{O}_2 \rightarrow$  (D)  $\text{H}_2\text{O} \rightarrow \text{photosystem I} \rightarrow \text{photosystem II}$  (E)  $\text{H}_2\text{O} \rightarrow \text{NADPH} \rightarrow \text{Calvin cycle}$
- 18) Mutation of DNA within a single somatic cell of a multicellular organism (A) may have no phenotypic consequence (B) is usually inherited by individuals in future generations (C) automatically results in cell death (D) is generally deleterious to the organism (E) creates hundreds of genetic alterations during DNA replication
- 19) Which of the following is present in double-stranded cDNA but absent in the corresponding genomic DNA? (A) A homopolymeric sequence of A:T base pairs (B) Promoter sequences (C) Intron sequences (D) 5' and 3' untranslated sequences (E) Exon sequences
- 20) The phospholipids of plasma membranes routinely exhibit which of the following forms of movement?  
I. Diffusion in the plane of the bilayer. II. Translocation from one side of the bilayer to the other side.  
III. Rotation of fatty-acid residues around saturated carbon atoms. (A) I only (B) II only (C) III only (D) I and III only (E) I, II and III