國立中山大學112學年度
學士後醫學系招生考試試題

科目名稱：普通生物及生化概論

—作答注意事項—

考試時間：100分鐘

- 考試開始鈴響前不得翻閱試題，並不得書寫、劃記、作答。請先檢查答案卡之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。
- 答案卡請以2B鉛筆劃記，不可使用修正液（帶）塗改，未使用2B鉛筆、劃記太輕或污損致光學閱讀機無法辨識答案者，後果由考生自負。
- 答案卡應保持清潔完整，不得折疊、破壞或塗改應考證號碼及條碼，亦不得書寫考生姓名、應考證號碼或與答案無關之任何文字或符號。
- 不可使用計算機，並不得攜帶具有通訊、記憶或收發等功能或其他有礙試場安寧、考試公平之各類器材、物品（如鬧鈴、行動電話、電子字典等）入場。
- 試題及答案卡請務必繳回，未繳回者該科成績以零分計算。
- 試題採雙面列印，考生應注意試題頁數確實作答。
- 違規者依本校招生考試試場規則及違規處理辦法處理。

國立中山大學112學年度學士後醫學系招生考試試題

科目名稱：普通生物及生化概論

※本科目依簡章規定「不可以」使用計算機(選擇題)

選擇題(單一選擇題，共 90 題，總分 150 分)

壹、第 1~30 題每題 1 分，共計 30 分，答錯 1 題倒扣 0.25 分，倒扣至本大題零分為止，未作答，不給分亦不扣分。

1. _____ refer to the aggregates of rough endoplasmic reticulum (rER) and polysomes that confer the cytological hallmark of neurons revealed by the conventional staining.
   (A) Wallerian stumps
   (B) Cajal masses
   (C) Nissl bodies
   (D) Leeuwenhoek processes
   (E) Schwann recesses
   Ans: (C)

2. Collections of neuronal cell bodies in the central nervous system are called:
   (A) Ganglia
   (B) Neuroglia
   (C) Nodes
   (D) Nuclei
   (E) White matter
   Ans: (D)

3. _____ connect the intermediate filament system of two adjacent epithelial cells.
   (A) Adherent junctions
   (B) Desmosomes
   (C) Occluding junctions
   (D) Gap junction
   (E) Focal contacts
   Ans: (B)

4. What will happen when you trigger an action potential at each end of a very long axon?
   (A) Both action potentials will continue their transmissions to their respective distal ends.
   (B) The action potential starts close to the soma will transmit to the other end.
   (C) The action potential starts far away from the soma will transmit to the other end.
   (D) Two action potentials will merge into one action potential that subsequently transmits to the axon terminal in a larger amplitude.
   (E) Two action potentials will cancel each other around the middle of this axon.
   Ans: (E)

5. Diapedesis occurs at:
   (A) vasa vasorum
   (B) arteries
   (C) capillaries
   (D) postcapillary venules
   (E) inferior vena cava
   Ans: (D)

6. Oxygen crosses a plasma membrane by
   (A) osmosis.
   (B) active transport.
   (C) pinocytosis.

(D) passive transport.
(E) receptor mediated endocytosis.
Ans: (D)

7. _____ helps the maintenance of membrane fluidly of animal cells in cold environments.
(A) PIP2
(B) Glycerol
(C) Cholesterol
(D) Phospholipid
(E) Fibronectin
Ans: (C)

8. Which of the following is not the derivatives of mesoderm in vertebrates?
(A) Skeletal systems
(B) Circulation and lymphatic systems
(C) Dermis of skin
(D) Adrenal cortex
(E) Thymus
Ans: (E)

9. The destination of ubiquitinated proteins in cytosol is _____.
(A) lysosome
(B) autophagosome
(C) proteosome
(D) spliceosome
(E) peroxisome
Ans: (C)

10. Which of the following genotypes due to nondisjunction of sex chromosomes is lethal?
(A) XXX
(B) OY
(C) XXY
(D) XO
(E) None of the above
Ans: (B)

11. What do hagfishes and lampreys have in common with the extinct conodonts?
(A) Lungs
(B) The jawless condition
(C) Bony vertebrae
(D) Their mode of feeding
(E) Swim bladders
Ans: (B)

12. A polymerase chain reaction must have:

I. DNA template	II. DNA primers	III. RNA polymerase
IV. dNTPs	V. DNA polymerase	VI. RNA primers

(A) I, II, III, IV
(B) I, II, IV, V
(C) I, III, IV, VI

(D) I, II, V
(E) I, IV, V, VI
Ans: (B)

13. The major inhibitory neurotransmitter of the human brain is _____.
(A) acetylcholine
(B) epinephrine
(C) endorphin
(D) nitric oxide
(E) GABA
Ans: (E)

14. What do fungi and arthropods have in common?
(A) Both groups are commonly coenocytic.
(B) The haploid state is dominant in both groups.
(C) Both groups are predominantly heterotrophs that ingest their food.
(D) The protective coats of both groups are made of chitin.
(E) Both groups have cell walls.
Ans: (D)

15. Short-term memory information processing usually causes changes in the
(A) brainstem.
(B) medulla.
(C) hypothalamus.
(D) hippocampus.
(E) cranial nerves.
Ans: (D)

16. The cyclic adenosine monophosphate (cAMP) is synthesized by _____, and it is degraded by _____.
(A) adenylate cyclase; phosphodiesterases
(B) phosphodiesterases; adenylate cyclase
(C) adenylate cyclase; phosphoesterases
(D) phosphoesterases; adenylate cyclase
(E) None of the above is correct
Ans: (A)

17. What are (1), (2) and (3) for the following reaction?
Pyruvate + __(1)__ + CoA-SH $\xrightarrow{(2)}$ Acetyl-CoA + __(3)__ + CO_2
(A) NADH, pyruvate decarboxylase, NAD^+
(B) NADH, pruvate dehydrogenase, NAD^+
(C) NAD^+, pyruvate decarboxylase, NADH
(D) NAD^+, pruvate dehydrogenase, NADH
(E) None of the above is correct
Ans: (D)

18. Each round of the Tricarboxylic Acid Cycle (TCA cycle) produces _____.
(1) two molecules of carbon dioxide
(2) one molecule of ATP
(3) two molecules of NADH

(4) one molecule of $FADH_2$
(A) (1) and (2)
(B) (2) and (3)
(C) (1) and (4)
(D) (3) and (4)
(E) All of the above are correct
Ans: (C)

19. Which of the following molecule can cross cell membranes freely?
(A) Carbon dioxide
(B) Na^+
(C) K^+
(D) All of the above
(E) None of the above
Ans: (A)

20. The allosteric enzyme PFK-1 (Phosphofructokinase-1) catalyzes the committed step of glycolysis. Which of the following statements about PFK-1 is correct?
(A) It is inhibited by ADP and stimulated by AMP.
(B) It is inhibited by high pH.
(C) It is stimulated by citrate.
(D) It is stimulated by insulin but is inhibited by epinephrine in muscle cells.
(E) It is stimulated by insulin and inhibited by glucagon in liver cells.
Ans: (E)

21. Which of the following pairs of amino acids could form a charge-charge interaction through their R-groups (side chains)?
(A) serine and glutamic acid
(B) glutamine and lysine
(C) methionine and histidine
(D) lysine and arginine
(E) aspartic acid and lysine
Ans: (E)

22. NADPH is synthesized mainly in which of the following pathways?
(A) Glycolysis
(B) Pentose Phosphate Pathway
(C) TCA cycle
(D) Urea cycle
(E) Gluconeogenesis
Ans: (B)

23. The isoelectric point of tyrosine is _____. ($pK_1 = 2.2$; $pK_2 = 9.11$; $pKa = 10.07$ of the side chain)
(A) 5.66
(B) 6.135
(C) 7.126
(D) 9.11
(E) 9.59
Ans: (A)

24. The disease gout is a disease of the joints, usually in males, caused by an elevated concentration of _____ in the blood and tissues.
(A) heme
(B) xanthine
(C) hypoxanthine
(D) uric acid
(E) inosine
Ans: (D)

25. Which of the following amino acids does not belong to glucogenic amino acid?
(A) Ala
(B) Arg
(C) Cys
(D) Glu
(E) Leu
Ans: (E)

26. Which is not an enzyme required for glycolysis?
(A) Hexokinase
(B) Phosphofructokinase
(C) Triosephosphate isomerase
(D) Cyclin-dependent kinase
(E) Pyruvate kinase
Ans: (D)

27. Which of the following is not a post-translational modification of a protein?
(A) Methylation
(B) Phosphorylation
(C) Alternative splicing
(D) Disulfide bond
(E) Acetylation
Ans: (C)

28. Lecithin is composed of _____.
(A) Glycerol + Fatty acid + Phosphoric acid + Serine
(B) Glycerol + Fatty acid + Phosphoric acid + Ethanolamine
(C) Glycerol + Fatty acid + Phosphoric acid + Betaine
(D) Glycerol + Fatty acid + Phosphoric acid + Choline
(E) None of the above
Ans: (D)

29. Amino acid residues which are predominantly involved in the protein-DNA interaction are _____.
(A) positively charged
(B) negatively charged
(C) proline
(D) alanine
(E) glycine
Ans: (A)

30. What are bile salts?

(A) Charged phospholipid
(B) Esterified cholesterol
(C) Hydrolyzed forms of triacylglycerol
(D) Amphipathic cholesterol analogs with detergent properties
(E) All of the above
Ans: (D)

貳、第31~90題每題2分，共計120分，答錯1題倒扣0.5分，倒扣至本大題零分為止，未作答，不給分亦不扣分。

31. Where are the aged red blood cells captured and recycled in healthy adults?
(A) Periarteriolar lymphoid sheath (PALS)
(B) Splenic sinusoids
(C) Bone marrow
(D) Kidney
(E) Splenic white pulp
Ans: (B)

32. The _____ provides the luminal lining of large-diameter conducting airway.
(A) ciliated stratified cuboidal epithelium
(B) simple columnar epithelium
(C) stratified squamous epithelium
(D) ciliated pseudostratified columnar epithelium
(E) transitional epithelium
Ans: (D)

33. Which of the following is absent from the wall of small-diameter (~ 1 mm) bronchioles?
(A) Epithelium
(B) Cartilage
(C) Smooth muscle
(D) Blood vessels
(E) Elastic fiber
Ans: (B)

34. What is the general sequential steps of human urine production?
(A) Filtration → secretion → reabsorption → excretion
(B) Secretion → filtration → reabsorption → excretion
(C) Secretion → reabsorption → filtration → excretion
(D) Filtration → reabsorption → secretion → excretion
(E) Filtration → excretion → secretion → reabsorption
Ans: (D)

35. The sudden surge of _____ a few hours before ovulation changes the enzymatic activities of theca externa cells and alters the tunica albuginea on the Graaffian follicle, leading to the eventual ovulation.
(A) FSH
(B) inhibin
(C) estradiol
(D) LH

(E) testosterone
Ans: (D)

36. Forward left heart failure will cause which of the following?
(A) Reduced cardiac output
(B) Pulmonary edema
(C) Reduced urine output
(D) Edema at lower limbs
(E) All of the above
Ans: (E)

37. When you accidentally drip-infused an additional 250 mL of normal saline to a healthy individual, his body removed the additional fluid via the activation of:
(A) Atrial natriuretic peptide system
(B) Renin-angiotensin-aldosterone system
(C) Antidiuretic hormone system
(D) Sympathetic system
(E) None of the above
Ans: (A)

38. After stabilizing this patient via the emergency trauma surgeries, which of the following in this patient could be expected in the next 24-48 hours?
(A) Increase in basophil percentage beyond 5%
(B) Increase in eosinophil percentage beyond 10%
(C) Increase in reticulocytes percentage beyond 3.5%
(D) Megakaryocytes would be detected in the peripheral blood
(E) Macrophages could be detected in the peripheral blood
Ans: (C)

39. After the emergency surgeries, the plasma potassium level of this patient appeared slightly higher than the normal level of 5.5 mEq/L. What might this patient experience most noticeably?
(A) Muscle weakness
(B) Tachycardia
(C) Bradycardia
(D) Diarrhea
(E) GERD
Ans: (B)

40. A man fell from a 1.5 m high platform and bumped the right side of his head directly against the concrete floor. Shortly after the incident, he appeared confused, unsure of his location, time of the day, and the events leading to his fall. He also complained about headaches on his right side. The horizontal CT scan of his head showed a lens-shaped radiopaque inside the right temporal cranium. This patient likely suffered from:
(A) skin abrasion
(B) subcutaneous bruises
(C) epidural hematoma
(D) subdural hematoma
(E) subarachnoid hemorrhage
Ans: (C)

41. Which of the following statements about MHC I proteins is true?
(A) They are found primarily on immune system cells.
(B) They protect a developing fetus from the immune system of mother.
(C) They are found on the surface of most mammalian cells.
(D) They are antibodies.
(E) All of the above are true.
Ans: (C)

42. Which of the following is the visual evidence of genetic recombination during meiosis?
(A) Centromeres
(B) Synaptonemal complexes
(C) Chiasmata
(D) Secondary constrictions
(E) Mitotic spindle
Ans: (C)

43. Mammals are homeostatic for all of the following EXCEPT
(A) Body temperature
(B) Blood glucose concentration
(C) Blood pH
(D) Metabolic rate
(E) Blood calcium concentration
Ans: (D)

44. Which of the following is true for the phenomenon of "epistasis" in genetics?
(A) It is a type of gene interaction in which the phenotype expression of one gene alters that of another independently inherited gene.
(B) It is the inheritance of traits transmitted by mechanisms that do not involve the nucleotide sequence.
(C) It only occurs in mammals.
(D) It is the mechanism for the inheritance of organelles.
(E) It controls the early development of Drosophila.
Ans: (A)

45. The nontemplate strand of a portion of a gene reads: 5'-TTCACTGGTTCA. What is the sequence of the resulting transcript (RNA) for this portion?
(A) 5'-AAGUGACCAAGU
(B) 5'-UGAACCAGUGAA
(C) 5'-UUCACUGGUUCA
(D) 5'-ACUUGGUCACUU
(E) 5'-TGAACCAGTGAA
Ans: (C)

46. During protein synthesis, which of the following proteins interacts via its *N*-terminal sequence with the signal recognition particle (SRP)?
(A) Nuclear matrix protein
(B) Lysosomal protein
(C) Ribosomal protein
(D) Mitochondrial protein
(E) Chloroplast protein

Ans: (B)

47. The main function of the atrioventricular (A-V) node is to
(A) initiate the heartbeat.
(B) set the rhythm of the heartbeat.
(C) relay the signal for the heart to contract from the left ventricle to the left atrium.
(D) relay a signal for the ventricles to contract.
(E) detect the vibration of heart.
Ans: (D)

48. Which of the following statements about fungi is true?
I. They are eukaryotic.
II. They all have rigid cell walls.
III. Most are filamentous.
IV. Some are photosynthetic.
V. They are capable of only asexual reproduction.
(A) I. II. V
(B) I. II. III
(C) I. II. IV
(D) I. II. IV. V
(E) I. II. III. IV
Ans: (B)

49. Which of the following is present in double-stranded cDNA but absent in the corresponding genomic DNA of eukaryotic cells?
(A) Promoter sequences
(B) A homopolymeric sequence of A:T base pairs
(C) Intron sequences
(D) 5' and 3'UTRs
(E) Exon sequences
Ans: (B)

50. Which of the followings are the RNA-protein complex:
I. Ribosome　II. Nucleosome　III. Lysosome　IV. Spliceosome　V. Telomerase
(A) I, II, IV
(B) I, II, III, IV
(C) I, III, IV, V
(D) I, IV, V
(E) I, II, III, IV, V
Ans: (D)

51. Which of the following is incorrect for the function of glia in the CNS of adult vertebrates?
(A) Ependymal cells help form the blood-brain barrier.
(B) Astrocytes can act as stem cells.
(C) Oligodendrocytes myelinate axons in the CNS.
(D) Microglia are immune cells in the CNS.
(E) Astrocytes promote blood flow to neurons.
Ans: (A)

52. Which plant hormone is incorrectly paired with its function?

(A) Auxin - promotes stem growth through cell elongation
(B) Cytokinins - initiate programmed cell death
(C) Gibberellins - stimulate seed germination
(D) Abscisic acid - promotes seed dormancy
(E) Ethylene - inhibits cell elongation
Ans: (B)

53. Which of the following vitamins is correctly associated with its use?
(A) Vitamin C - curing rickets
(B) Vitamin A - incorporated into the visual pigment of the eye
(C) Vitamin D - calcium removal from bone
(D) Vitamin E - protection of skin from cancer
(E) Vitamin K - production of white blood cells
Ans: (B)

54. The MHC (Major Histocompatibility Complex) is important in a T cell's ability to _____.
(A) distinguish self from nonself
(B) recognize specific parasitic pathogens
(C) identify specific bacterial pathogens
(D) identify specific viruses
(E) recognize differences among types of cancer
Ans: (A)

55. Which combination of hormones helps a mother to produce milk and nurse her baby?
(A) Prolactin and calcitonin
(B) Oxytocin and prolactin
(C) Follicle-stimulating hormone and luteinizing hormone
(D) Luteinizing hormone and oxytocin
(E) Oxytocin, prolactin, and luteinizing hormone
Ans: (B)

56. Dog breeders maintain the purity of breeds by keeping dogs of different breeds apart when they are fertile. This kind of isolation is most similar to which of the following reproductive isolating mechanisms?
(A) Reduced hybrid fertility
(B) Hybrid breakdown
(C) Mechanical isolation
(D) Habitat isolation
(E) Gametic isolation
Ans: (D)

57. Photosynthesis ceases when leaves wilt, mainly because_____.
(A) the chlorophyll of wilting leaves breaks down
(B) flaccid mesophyll cells are incapable of photosynthesis
(C) stomata close, preventing CO_2 from entering the leaf
(D) photolysis, the water-splitting step of photosynthesis, cannot occur when there is a water deficiency
(E) accumulation of CO_2 in the leaf inhibits enzymes
Ans: (C)

58. Which of the following pathways is most likely taken by newly synthesized histones?
(A) Rough endoplasmic reticulum → Golgi complex → secretory vesicle
(B) Rough endoplasmic reticulum → Golgi complex → nucleus
(C) Rough endoplasmic reticulum → smooth endoplasmic reticulum → nucleus
(D) Cytoplasm → nucleus
(E) Cytoplasm → rough endoplasmic reticulum → Golgi complex → nucleus
Ans: (D)

59. In the communication link between a motor neuron and a skeletal muscle, which of the following descriptions is right?
(A) The motor neuron is considered the presynaptic cell and the skeletal muscle is the postsynaptic cell.
(B) The motor neuron is considered the postsynaptic cell and the skeletal muscle is the presynaptic cell.
(C) Action potentials are possible on the motor neuron but not the skeletal muscle.
(D) Action potentials are possible on the skeletal muscle but not the motor neuron.
(E) The motor neuron fires action potentials but the skeletal muscle is not electrochemically excitable.
Ans: (A)

60. In nerves, vesicles can move the length of an axon at a rate that far exceeds that which would be predicted for simple diffusion. Which of the following models best explains vesicular movement in these cells?
(A) Depolymerization of actin microfilaments attached to vesicles pulls the vesicles toward the site of depolymerization.
(B) Vesicles are propelled by fluid movement generated by changes in osmotic potential within the cells.
(C) Vesicles are moved by alternate contraction and relaxation of actin-myosin "muscle" complexes.
(D) Vesicles, by virtue of their net negative charge, are attracted to positively charged regions of the cell.
(E) Vesicles are attached to the protein kinesin, which slides along microtubules by an ATP dependent process.
Ans: (E)

61. Which kinds of the following nucleic acid can form viral genome?
(1) double-stranded DNA
(2) single-stranded DNA
(3) single-stranded RNA
(A) (1) only
(B) (1) and (2)
(C) (1) and (3)
(D) None of the above is correct
(E) All of the above are correct
Ans: (E)

62. Retroviral vectors are more popular for somatic gene therapy than other viral vectors because:
(A) They replicate faster than most other viruses.
(B) They contain several copies of their DNA genome in the virus particle.
(C) They can integrate themselves into the host cell DNA.
(D) Their replication is more accurate than that of most other viruses.
(E) Their DNA has extensive sequence homology with normal cellular DNA.

Ans: (C)

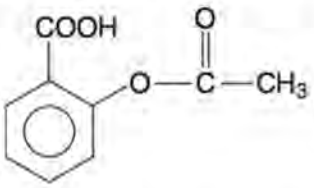
63. cAMP regulates the transcription of many genes. What is the major mechanism for this action?
(A) It induces the phosphorylation of transcription factors.
(B) It binds directly to cAMP response elements in promoters and enhancers.
(C) It mediates this effect by increasing the calcium concentration in the cytoplasm and the nucleus.
(D) It binds directly to nuclear transcriptionfactors.
(E) It induces the phosphorylation of STAT proteins, thus enabling them to translocate into the nucleus.
Ans: (A)

64. Which of the following statements regarding circulating immunoglobulins is correct?
(1) They are produced by B-cell–derived plasma cells.
(2) Their diversity is generated by gene rearrangements in the developing B cells.
(3) Each immunoglobulin producing cell generates only one kind of immunoglobulins.
(A) (1) and (2)
(B) (1) and (3)
(C) (2) and (3)
(D) None of the above is correct
(E) All of the above are correct
Ans: (E)

65. During long-term fasting, the liver produces acetyl-CoA by the β-oxidation of fatty acids. What is the major metabolic fate of this acetyl-CoA?
(A) Fatty acid biosynthesis
(B) Gluconeogenesis
(C) Amino acid biosynthesis
(D) Ketogenesis
(E) Oxidation in the TCA cycle
Ans: (D)

66. On a high-carbohydrate, low-fat diet, carbohydrates are converted into fat through a series of reactions listed below. What is the correct sequence of these reactions?
(1) esterification
(2) glycolysis
(3) fatty acid biosynthesis
(A) (1), (2), (3)
(B) (1), (3), (2)
(C) (2), (3), (1)
(D) (2), (1), (3)
(E) (3), (2), (1)
Ans: (C)

67. The molecule shown here is acetylsalicylic acid (aspirin). What kind of electrical charge does aspirin carry in the stomach at a pH value of 2 and in the small intestine at a pH value of 7?



(A) Negatively charged in the stomach; positively charged in the intestine
(B) Negatively charged both in the stomach and the intestine
(C) Uncharged in the stomach; negatively charged in the intestine
(D) Uncharged both in the stomach and the intestine
(E) Uncharged in the stomach; positively charged in the intestine
Ans: (C)

68. The brain produces most of its energy by the oxidation of glucose; during long-term fasting, however, it can cover more than half of its energy needs from _____.
(A) anaerobic glycolysis
(B) oxidation of its stored glycogen
(C) oxidation of free fatty acids
(D) oxidation of amino acids
(E) oxidation of ketone bodies
Ans: (E)

69. Which of the following reactions is not the reversible reaction in glycolysis?
(A) Glucose 6-phosphate to fructose 6-phosphate
(B) Fructose 6-phosphate to fructose 1,6-bisphosphate
(C) Glyceraldehyde 3-phosphate to 1,3-bisphosphoglycerate
(D) 3-Phosphoglycerate to 2-phosphoglycerate
(E) 2-Phosphoglycerate to phosphoenolpyruvate
Ans: (B)

70. Which amino acid is the common donor for methyl transfer?
(A) Met
(B) Ala
(C) Gly
(D) Ser
(E) Lys
Ans: (A)

71. Which of the following best describes the metabolic outcome of glycolysis for the degradation of glucose?
(A) 2 Pyruvate, 4 ATP, 4 NADH
(B) 2 Pyruvate, 2 ATP, 2 NADH
(C) 2 Pyruvate, 4 ATP, 2 NADH
(D) 4 Pyruvate, 2 ATP, 4 NADH
(E) 4 Pyruvate, 4 ATP, 2 NADH
Ans: (B)

72. Which step of the TCA cycle can generate GTP directly?
(A) Citrate to isocitrate

(B) Isocitrate to α-ketoglutarate
(C) α-Ketoglutarate to succinyl-CoA
(D) Succinyl-CoA to succinate
(E) Succinate to fumarate
Ans: (D)

73. Fatty acids with 14 or high carbons require _____ for transport into mitochondria.
(A) glycerol-3-phosphate shuttle
(B) carnitine shuttle
(C) clathrin
(D) citrate shuttle
(E) malate-aspartate shuttle
Ans: (B)

74. The mutation that occurs in sickle cell anemia belongs to _____.
(A) silent mutation
(B) missense mutation
(C) nonsense mutation
(D) frameshift mutation
(E) insertion mutation
Ans: (B)

75. Which of the following is with the same binding site as O_2 in hemoglobin?
(A) CO
(B) CO_2
(C) NO_2
(D) 2,3-BPG
(E) 1,3-BPG
Ans: (A)

76. The synthesis of 1 molecule of cholesterol requires _____ molecules of isopentenyl pyrophosphate, with each molecule of isopentenyl pyrophosphate requiring _____ molecules of acetyl-CoA.
(A) 4; 2
(B) 5; 2
(C) 6; 2
(D) 5; 3
(E) 6; 3
Ans: (E)

77. Which of the following nucleoside analogs is used against HIV?
(A) 2',3'-Dideoxycytidine (ddC)
(B) 3'-Azido-2',3'-dideoxythymidine (AZT)
(C) 2',3'-Dideoxyinosine (ddI)
(D) 3'-Thiacytidine (3TC)
(E) 2',3'-Didehydro-3'-deoxythymidine (d4T)
Ans: (B)

78. The process of "sugar modification" to proteins starts in the _____?
(A) endoplasmic reticulum
(B) Golgi complex

(C) mitochondria
(D) nucleolus
(E) vacuole
Ans: (A)

79. Very low-density lipoprotein (VLDL) is a lipoprotein produced by the liver and circulated in the blood. Which of the following is not the main component of its initial stage?
(A) Triglycerides
(B) Cholesterol
(C) Apolipoprotein C
(D) Apolipoprotein B
(E) Pyridoxal phosphate
Ans: (E)

80. In protein structure, disulfide bonds are formed by two _____.
(A) Ser
(B) Tyr
(C) Cys
(D) Asp
(E) His
Ans: (C)

81. Sphingomyelinase catalyzes the conversion of sphingomyelin into _____.
(A) ceramide and acetylcholine
(B) ceramide and phosphatidylinositol
(C) ceramide and phosphatidylserine
(D) ceramide and phosphocholine
(E) ceramide and pyrophosphate
Ans: (D)

82. Dietary polysaccharides are metabolized by _____ to monosaccharides; intracellular carbohydrate store, as glycogen, are metabolized by _____ to monosaccharides.
(A) hydrolysis; hydrolysis
(B) hydrolysis; phosphorolysis
(C) phosphorolysis; hydrolysis
(D) phosphorolysis; phosphorolysis
(E) hydrolysis; glycolysis
Ans: (B)

83. What is the major purpose of the pentose phosphate pathway?
(A) Generate NAD^+ for oxidative biosynthesis
(B) Generate NADH for reductive biosynthesis
(C) Generate $FADH_2$ for reductive biosynthesis
(D) Generate ribose-5-phosphate for nucleotide biosynthesis
(E) Generate ATP for energy biosynthesis
Ans: (D)

84. Within the electron transport chain, complex _____ represents the entry point for electrons from NADH while complex _____ represents the entry point for electrons from $FADH_2$.
(A) I; II

(B) II; III
(C) III; IV
(D) I; III
(E) II; IV
Ans: (A)

85. People who can have relatively high level of pyruvate in their blood due to _____; what enzyme that contains this cofactor is inactivated?_____
(A) Vitamin B deficiency; pyruvate carboxylase
(B) Vitamin C deficiency; pyruvate kinase
(C) Thiamine deficiency; pyruvate dehydrogenase
(D) Alcohol intake; pyruvate dehydrogenase
(E) PLP deficiency; pyruvate transaminase
Ans: (C)

86. What cofactors are in acyl-CoA dehydrogenase?
(A) FAD
(B) ATP
(C) Mg^{2+}
(D) NADH
(E) cAMP
Ans: (A)

87. Protein three-dimensional structures can NOT be determined by _____.
(A) X-ray crystallography
(B) NMR
(C) cryo-electron microscopy
(D) high performance liquid chromatography
(E) small angle X-ray scattering
Ans: (D)

88. Intrinsic fluorescence of GFP is contributed by _____.
(A) cyclization and oxidation of residues: Ser - Trp - Gly
(B) cyclization and oxidation of residues: Ser - Tyr - Gly
(C) cyclization and oxidation of residues: Ser - Tyr - Ala
(D) cyclization and oxidation of residues: Thr - Tyr - Gly
(E) cyclization and oxidation of residues: Gly - Trp - Ser
Ans: (B)

89. Several classes of hydrolases are localized in _____.
(A) Golgi vesicle
(B) lysosomes
(C) late endosome
(D) mitochondria
(E) nucleus
Ans: (B)

90. Match the co-enzyme in List I severing as the transient carrier with the specific item or functional group in List II:

List I	List II

A. Coenzyme A	I.	Aldehyde groups
B. Thiamine pyrophosphate	II.	Amino groups
C. Pyridoxal phosphate	III.	Hydrogen atoms
D. Coenzyme Q10	IV.	Acyl groups
E. Flavin adenine dinucleotide	V.	Quinone group

(A) A – III, B – I, C – II, D – V, E – IV
(B) A – IV, B – I, C – II, D – V, E – III
(C) A – I, B – II, C – III, D – IV, E – V
(D) A – II, B – V, C – III, D – IV, E – I
(E) A – I, B – V, C – III, D – IV, E – II
Ans: (B)