高雄醫學大學 107 學年度學士後醫學系招生考試試題

科目：普通生物學及生化概論　　考試時間：100 分鐘

說明：一、選擇題用 2B 鉛筆在「答案卡」上作答，修正時應以橡皮擦擦拭，不得使用修正液(帶)，未遵照正確作答方法而致電腦無法判讀者，考生自行負責。
二、試題及答案卡必須繳回，不得攜出試場。

I.【單選題】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。
1~15 題為普通生物學，16~30 題為生化概論。

1. _____ are membrane protrusions that facilitate the absorption of nutrients. What is the name of these protrusions and what cytoskeletal element forms their internal skeleton?
(A) Microvilli, microtubules (B) Microvilli, actin filaments
(C) Microvilli, intermediate filaments (D) Villi, microtubules
(E) Villi, actin filaments

2. What causes a differentiating B cell to become committed to producing only one species of antibody molecule?
(A) DNA rearrangements in the genome (B) RNA rearrangements in the genome
(C) protein rearrangements in the genome (D) DNA rearrangements in the mitochondria
(E) RNA rearrangements in the mitochondria

3. Which of the following about neuron is **incorrect**?
(A) It is a polarized cell.
(B) Peripheral nervous system includes autonomic and somatic nervous systems.
(C) The generation of action potential is related to the electrochemical gradient across the plasma membrane.
(D) Myelin sheath is a protein-rich substance that surrounds the axon of some neurons, forming an electrically insulating layer.
(E) Neurofilaments are intermediate filaments found in neurons.

4. In the life cycle of an angiosperm, which of the following cells or tissues are diploids?
(A) generative cells (B) microsporocyte
(C) antipodal cells (D) tube cells
(E) polar nuclei of the embryo sac

5. The black dots that cover strawberries are actually individual fruits from a flower with multiple carpels. The fleshy and tasty portion of a strawberry derives from the receptacle of the flower. Therefore, a strawberry is _____.
(A) both an aggregate fruit and an accessory fruit
(B) both a multiple fruit and an accessory fruit
(C) both a multiple fruit and an aggregate fruit
(D) both a simple fruit and an aggregate fruit
(E) both a simple fruit and an accessory fruit

6. During splicing, which major molecular component of the spliceosome catalyzes the excision reaction?
(A) protein (B) DNA (C) RNA (D) lipid (E) sugar

7. Which of the following statements regarding the body plans of animal is **correct**?
(A) Cnidarian are bilateral symmetry.
(B) Nematodes are acoelomate.
(C) Platyhelminthes are radial symmetry.
(D) Annelids are psudocoelomate.
(E) Chordates are deuterostomia.

8. In a phylogenetic tree, a group is composed of some species but not their most recent common ancestor. This is an example of _____.
(A) monophyletic group (B) paraphyletic group
(C) polyphyletic group (D) polytomy
(E) dicotomy

9. Bioluminescence is an important strategy for attracting preys in which of the following marine zone?
(A) benthic zone (B) intertidal zone
(C) oceanic zone (D) aphotic zone
(E) photic zone

10. Which of the following descriptions regarding sensory receptors is **correct**?
    (A) Sense of smell is generated through mechanoreceptors.
    (B) Vision is generated through chemoreceptors.
    (C) Thermoreceptors detect change of pressures.
    (D) Nocireceptors detect pain feelings.
    (E) Photoreceptors detect sense of taste.

11. Which statement is **incorrect** concerning protein translation?
    (A) Ribosomes in prokaryotic and eukaryotic cells have two subunits of unequal size.
    (B) Sequences exist in prokaryotic and eukaryotic rRNA that are so similar, that they likely derive from a common ancestor.
    (C) Initiator tRNA recognizes AUG codons during initiation at the P site of ribosome.
    (D) The 30S and 50S ribosomal subunits of *E. coli* combine to generate an 80S subunit.
    (E) Polysomes are rich in cells active in protein synthesis.

12. Testosterone is synthesized primarily by the _____.
    (A) Leydig cells (B) hypothalamus (C) sperm cells
    (D) anterior pituitary gland (E) seminiferous tubules

13. Which of the following orders regarding mammalian embryogenesis is **correct**?
    1. cleavage
    2. gastrula
    3. blastula
    4. cortical reaction
    5. neurulation
    6. acrosomal reaction
    (A) 132645 (B) 231546 (C) 461523 (D) 641325 (E) 654132

14. Which of the following descriptions regarding the embryonic germ layers is **correct**?
    (A) Pituitary gland is derived from mesoderm.
    (B) Thymus is derived from mesoderm.
    (C) Teeth are derived from mesoderm.
    (D) Adrenal cortex is derived from mesoderm.
    (E) Adrenal medulla is derived from mesoderm.

15. Which of the following about chloroplasts and mitochondria is **incorrect**?
    (A) They are of the appropriate size to be the descendants of bacteria.
    (B) They contain circular DNA not associated with histones.
    (C) They contain their own genome and produce all proteins they need.
    (D) Their ribosomes are more similar to those of bacteria than to those of eukaryotes.
    (E) Their membranes have enzymes and transport systems that resemble those in the plasma membrane of prokaryotes.

16. _____ are commonly referred to, respectively, as the 21^{st} and 22^{nd} amino acids.
    (A) Selenocysteine and pyrrolysine (B) Adenine and guanine
    (C) Thymine and uracil (D) Hydroxyproline and hydroxylysine
    (E) β-Alanine and D-alanine

17. Which of the following sequences is **not** found in an *E. coli* vector (such as pET21)?
    (A) replication origin (ori) (B) multiple cloning sites (MCS)
    (C) antibiotic resistance gene (Amp^R) (D) Shine-Dalgarno sequence
    (E) CMV promoter

18. Which of the following metabolic pathways is strictly anabolic?
    (A) glycolysis (B) gluconeogenesis (C) citric acid cycle
    (D) pentose phosphate cycle (E) β-oxidation of fatty acids

19. Dihydrouracil and pseudouridine are found predominantly in _____.
    (A) mRNA (B) rRNA (C) tRNA (D) Z form DNA (E) siRNA

20. Which oil listed below contains more than 60% unsaturated fatty acids?
    (A) beef (B) milk (C) coconut (D) palm (E) olive

21. In order to perform PCR, the following reagents must be included _____.
    (A) DNA fragment, primers flanking the region of interest, dNTPs, ddNTPS, DNA Polymerase
    (B) DNA fragment, primers flanking the region of interest, dNTPs, DNA Polymerase
    (C) DNA fragment, one primer, dNTPs, DNA Polymerase, DNA ligase
    (D) DNA fragment, primers flanking the region of interest, dNTPs, DNA Ligase
    (E) none of the above

22. The coding sequence of DNA is 5'-CGCTATAGCGTTT-3'. Which of the following sequences is its RNA transcript (mRNA)?
(A) 3'-CGCTATAGCGTTT-5' (B) 5'-CGCUAUAGCGUUU-3'
(C) 3'-GCGATATCGCAAA-5' (D) 5'-UUUCGCUAUAGCG-3'
(E) 5'-CGCTATAGCGTTT-3'

23. Gout is caused by ___ over degradation results in accumulation of uric acid.
(A) purine (B) pyrimidine (C) fatty acid (D) glucose (E) amino acid

24. Which of the following peptides has the largest molar extinction coefficient for UV absorption at 280 nm?
(A) Tyr-Glu-Gly-Lys (B) Phe-Arg-His-Phe (C) Gln-His-Cys-Ala (D) Val-Asp-Met-Trp (E) Ile-Lys-Asn-Ser

25. What main compound is transported from the cytosol to the mitochondria via malate-aspartate shuttle?
(A) NADH (B) NH_4^+ (C) $FADH_2$ (D) O_2 (E) oxaloacetate

26. What enzyme can generate citrulline?
(A) NO synthase (B) citrate dehydrogenase
(C) citrate oxidase (D) citrulline synthetase
(E) citrate peroxidase

27. The Tang Prize in Biopharmaceutical Science was awarded to Dr. Feng Zhang for _____.
(A) cancer immunotherapy
(B) vesicular transport
(C) mitochondrial fusion and fission
(D) discovery of nerve growth factor
(E) the development of CRISPR/Cas9 as a genome editing platform

28. What amino acid residue is required for the protein region to interact with Src homology 3 (SH3) domain?
(A) serine (B) proline (C) lysine (D) arginine (E) leucine

29. Molecular chaperones assist proteins in the formation of _____.
(A) aggregates (B) 3° structure (C) amide bonds (D) 1° structure (E) none of the above

30. Supercoiled DNA can be relaxed by _____.
(A) catenation (B) intercalation (C) nicking one strand (D) hybridization (E) denaturation

Ⅱ.【單選題】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。
31~60 題為普通生物學，61~90 題為生化概論。

31. Which of the following statements about transporters is **incorrect**?
(A) Proton pump is an electro-genic pump.
(B) Transport of sodium ions and potassium ions through sodium-potassium pump is an active transport.
(C) The membrane potential acts as an energy source that affects the traffic of charged substances across the membrane.
(D) Facilitated diffusion is a diffusion of solutes against their gradients.
(E) The transport of glucose via glucose transporter is affected by the temperature.

32. The following compounds function as neurotransmitters **except** _____.
(A) acetylcholine (B) creatine (C) γ-aminobutyrate
(D) 3,4-dihydroxyphenylalanine (DOPA) (E) glutamic acid

33. Which of the following about endocrine system is **incorrect**?
(A) Testis is a part of endocrine system.
(B) T3 and T4 are hormones derived from tyrosine.
(C) The alpha cells of pancreas produce glucagon to increase the blood glucose level.
(D) The heart is an endocrine organ because the cardiac cells produce atrial natriuretic peptide in response to high blood pressure.
(E) Estrogen is a water-soluble hormone that regulates the female reproductive system and sex characteristics.

34. When electrons flow along the electron transport chain of mitochondria, which of the following changes occurs?
(A) NAD^+ is oxidized.
(B) The pH of the matrix is increased.
(C) ATP synthase pumps protons by active transport.
(D) The cytochrome c of the electron transport chain phosphorylates ADP to ATP.
(E) The electron donor of complex I in the chain is $FADH_2$.

35. Which of the following is a **true** distinction between cellular respiration and lactate fermentation?
(A) NADH is oxidized by the electron transport chain only in respiration.
(B) Substrate-level phosphorylation is unique to lactate fermentation.
(C) Only respiration oxidized glucose.
(D) Respiration, but not lactate fermentation, is a catabolic pathway.
(E) NAD^+ functions as an oxidizing agent only in respiration.

36. Which of the following about cardiac muscle is **correct**?
(A) They contract only when stimulated by neurons.
(B) They lack an orderly arranged actin and myosin.
(C) They lack the striations of skeletal muscle.
(D) They have less sacroplasmic reticulum and thus contract more slowly than smooth muscle.
(E) They are connected by intercalated discs, through which action potentials spread to all cells in the heart.

37. Which of the following short-distance transport routes in plants goes through plasmodesmata?
(A) symplastic route (B) transmembrane route (C) apoplastic route
(D) apoptosis route (E) aquaporin route

38. In the process of photosynthesis, which of the following is **not** involved in the creation of H^+ gradient thylakoid lumen and stroma that generates ATP?
(A) reduction of $NADP^+$
(B) splitting of water in the thylakoid lumen
(C) PQ cycle of the electron transport chain and its reaction to cytochrome b6f complex
(D) regeneration of RuBP
(E) electron transport

39. X chromosome inactivation is an epigenetic mechanism that silences the majority of genes on one X chromosome. The inactivation appears to involve regions of _____.
(A) mutated genes (B) intense transcription
(C) hyper-methylated DNA (D) hypo-methylated DNA
(E) inverted genes

40. According to the intermediate disturbance hypothesis, species richness is higher in areas of intermediate levels of disturbance. Why would species richness be lower at low levels of disturbance?
(A) A high nutrient level poisons lots of species.
(B) Competitive exclusion results in the extinction of species.
(C) Ecological niches are less partitioned in places with high levels of disturbance.
(D) Lack of disturbance slows down the evolution of new species.
(E) Low level of disturbance results in low soil fertility.

41. Taxol is an anticancer drug extracted from the Pacific yew tree. In animal cells, Taxol disrupts microtubule formation by binding to microtubules and accelerating their assembly from the protein precursor, tubulin. Surprisingly, this stops mitosis. Specifically, Taxol must affect _____.
(A) the formation of the mitotic spindle
(B) anaphase
(C) formation of the centrioles
(D) chromatid assembly
(E) the S phase of the cell cycle

42. Which of the following about transposable elements is **correct**?
(A) occurs only in bacteria
(B) occurs only in plants
(C) moves genes between homologous regions of DNA
(D) scatters genes to a new loci in the genome
(E) plays little role in evolution

43. The difference between pinocytosis and receptor-mediated endocytosis is that _____.
(A) pinocytosis brings only water molecules into the cell, but receptor-mediated endocytosis brings in other molecules as well
(B) pinocytosis increases the surface area of the plasma membrane whereas receptor-mediated endocytosis decreases the plasma membrane surface area
(C) pinocytosis requires cellular energy, but receptor-mediated endocytosis does not
(D) pinocytosis is nonselective in the molecules it brings into the cell, whereas receptor-mediated endocytosis offers more selectivity
(E) pinocytosis can concentrate substances from the extracellular fluid, but receptor-mediated endocytosis cannot

44. How does extracellular glucose inhibit transcription of the *lac* operon?
(A) by strengthening the binding of the repressor to the operator
(B) by weakening the binding of the repressor to the operator
(C) by degrading the *lac* operon gene
(D) by inhibiting RNA polymerase from opening the strands of DNA to initiate transcription
(E) by reducing the levels of intracellular cAMP

45. Which of the following traits do archaeans and bacteria share?
1. composition of the cell wall
2. presence of plasma membrane
3. lack of a nuclear envelope
4. identical rRNA sequences
(A) 1 and 2 (B) 1 and 3 (C) 1 and 4 (D) 2 and 3 (E) 2 and 4

46. Asbestos is a material that was once used extensively in construction. One risk from working in a building that contains asbestos is the development of asbestosis caused by the inhalation of asbestos fibers. Cells will take up asbestos by phagocytosis, but are not able to degrade it. As a result, asbestos fibers accumulate in _____.
(A) rough ER (B) lysosomes (C) Golgi apparatus (D) nuclear (E) peroxisomes

47. Which of the following is more likely an application of the concept of molecular clock?
(A) estimate the origin time of HIV virus
(B) estimate the vertical migration pattern of benthic diatoms
(C) estimate the rhythmic behaviors of intertidal species in the lab
(D) estimate the genetic diversity of a population
(E) estimate the reason for dinosaur extinction

48. Stem cell transplants may someday be used to treat Parkinson's disease. Researchers are hopeful that these cells would alleviate the symptoms of Parkinson's disease by _____.
(A) preventing temporal lobe seizures
(B) repairing sites of traumatic brain injury
(C) replenishing missing ion channels
(D) secreting the neurotransmitter dopamine
(E) changing in myelination of axons

49. Prezygotic isolating mechanisms act to limit hybridization and maintain the genetic identity of closely-related species. For sympatric corals that do synchronized spawning, what is the most likely isolation mechanism?
(A) behavioral isolation (B) temporal isolation (C) habitat isolation
(D) gametic isolation (E) hybrid breakdown

50. How does a noncompetitive inhibitor decrease the rate of an enzyme reaction?
(A) by binding to the active site of the enzyme, thus preventing binding of the normal substrate
(B) by binding to an allosteric site, thus changing the shape of the active site of the enzyme
(C) by decreasing the free-energy change of the reaction catalyzed by the enzyme
(D) by acting as a coenzyme for the reaction
(E) by binding to the substrate, thus changing its shape so that it no longer binds to the active site of the enzyme

51. Which of the following statements regarding insects is **correct**?
(A) Incomplete metamorphosis have a pupal stage.
(B) Metamorphosis from the larval stages to the adult occurs during pupal stage.
(C) Insects are analids.
(D) Book lung is a special organ in insects.
(E) Insects are lophotrochozoa.

52. Which of the following correctly describes the relationships between gross primary production (GPP), net primary production (NPP), autotrophic respiration (Ra), net ecosystem production (NEP) and total respiration of all organisms in the ecosystem (Rt)?
(A) NPP = GPP - Rt (B) GPP = NPP - NEP (C) Rt + Ra + NPP = GPP
(D) NPP = GPP - Ra (E) GPP = NEP + Rh

53. Which of the following statements regarding vertebrates is **correct**?
(A) Chondrichthyans have operculum.
(B) Amphibians are amniotes.
(C) Marsupials have fully developed placenta.
(D) Osteichthyans have swim bladders.
(E) None of the above.

54. Which of the following descriptions regarding appetite control of animal is **correct**?
(A) Ghrelin is produced by small intestine.
(B) Leptin triggers the feelings of hunger.
(C) Insulin suppresses appetite by acting on intestine directly.
(D) PYY acts as appetite suppressant.
(E) None of the above.

55. Which of the following statements regarding John Gurdon's experiments for nucleus transfer is **correct**?
(A) Frog eggs were enucleated by laser treatment.
(B) Donor nucleus from frog intestine cells cannot be developed into a tadpole.
(C) Donor nucleus from less differentiated cells are less likely to be developed into a tadpole.
(D) He concluded that the more differentiated cells may generate changes in the nucleus.
(E) None of the above.

56. In bird, the sex chromosome presented in egg, rather than sperm, determines the gender of the offspring. Therefore, females are ZW while males are ZZ. Which of the following statements is **correct**?
(A) W linked recessive mutation will never cause disease in males.
(B) Z linked recessive mutation will only affect female offspring.
(C) Unfertilized egg cells only carry Z chromosome.
(D) Some sperm cells carry W chromosome.
(E) None of the above.

57. Which of the following descriptions regarding circulatory system is **correct**?
(A) The circulatory fluid in closed circulatory system is called hemolymph.
(B) Blood in right ventricle will first deliver to aorta.
(C) Sinoatrial node is located in left atrium.
(D) Erythropoietin is produced from kidney.
(E) Mammals employ positive pressure breathing.

58. Which of the following descriptions regarding neuronal disorders is **correct**?
(A) Amyloid plaques are always observed in schizophrenia.
(B) Additive substances such as alcohol affect the dopamine regulation in brain.
(C) Dopamine can be used to treat Alzheimer patients.
(D) Parkinson's patients lost their ability to recognize people.
(E) Depression is a rare nervous system disorder.

59. Which of the following descriptions regarding muscle is **correct**?
(A) The length of thick filament will change in fully muscle contraction.
(B) A motor unit consists of multiple motor neurons and muscle fibers.
(C) Myoglobin binds oxygen tighter than hemoglobin does.
(D) Ca^{2+} binds with tropomyosin to initiate muscle contraction.
(E) Insect's skeletal muscles are grossly different from those of vertebrates.

60. Radiolabelled isotope dating is an important method to determine the age of a fossil. A ^{14}C content analysis of an animal fossil showed that its content is 0.01562 fold as much ^{14}C as the atmosphere. The half-life of ^{14}C is 5730 years. The age of the fossil is close to which of the following?
(A) 1000 years (B) 5730 years (C) 35000 years (D) 70000 years (E) 100000 years

61. Which of the following descriptions about the Michaelis-Menten equation is **false**?
(A) K_M measures the substrate concentration at which the reaction rate is $1/2V_{max.}$
(B) An enzyme with a low K_M means that it has low affinity for its substrate.
(C) An enzyme with a low k_{cat} means that it has a low catalytic rate.
(D) The turnover number, k_{cat}, measures the rate of the catalytic process.
(E) The ratio k_{cat}/K_M is a convenient measure of enzyme efficiency.

62. Which description about Hb (hemoglobin) is **false**?
(A) HbF has an $\alpha_2\gamma_2$ structure.
(B) HbA has an $\alpha_2\beta_2$ structure.
(C) HbF has a much higher affinity for 2,3-BPG than HbA does.
(D) 2,3-BPG lowers the O_2 affinity of HbA.
(E) 2,3-BPG is found inside red blood cells.

63. The carbon skeleton produced by transamination of aspartate enters the citric acid cycle as _____.
(A) acetyl-CoA (B) pyruvate (C) fumurate (D) oxaloacetate (E) α-ketoglutarate

64. 5-phosphoribosyl-1-pyrophosphate (PRPP) is a precursor in the synthesis of all of the following products **except** _____.
(A) histidine (B) tryptophan (C) arginine (D) UMP (E) AMP

65. In eukaryotic cells, mRNA modification includes _____.
(A) splicing out exons and join introns
(B) add a cap at 3' end to protect the 3' end
(C) add a phosphate group at 5' end to increase stability
(D) remove nucleotides at 3' end before addition of a poly A tail
(E) remove 3'UU and attach CCA

66. What is the appropriate order for oxidation of glucose to CO_2, H_2O and ATP?
1.convert pyruvate to acetyl CoA
2.electron-transport chain
3.citric acid cycle
4.oxidative-phosphorylation
5.glycolysis
(A) 3→5→1→4→2 (B) 5→1→3→2→4 (C) 1→4→5→2→3 (D) 3→1→4→2→5 (E) 4→1→3→5→2

67. Cooperative binding of a ligand to a protein is a form of allosteric binding. Which of the following statements is **false**?
(A) It is usually associated with proteins with multiple subunits.
(B) The binding of one ligand affects the affinities of other unfilled binding sites.
(C) The Hill plot results in a hyperbolic curve.
(D) It results in a sigmoidal binding curve.
(E) Hill coefficient (n_H) is a measure of the degree of cooperativity.

68. Ubiquitin is a small protein which is covalently linked to proteins designated for destruction via ____.
(A) ATP-dependent proteases in lysosomes
(B) ATP-dependent proteases in proteasomes
(C) ATP-dependent proteases in ribosomes
(D) ATP-independent proteases in endosomes
(E) ATP-independent proteases in peroxisomes

69. What of type reaction promotes the conversion of phosphatidylserine to phosphatidylethanolamine?
(A) transamination (B) acetylation
(C) dehydrogenation (D) methylation
(E) decarboxylation

70. What compound does **not** exist in the glyoxylate cycle?
(A) citrate (B) α-ketoglutarate (C) isocitrate (D) malate (E) oxaloacetate

71. Which compound is **not** one-carbon carrier in metabolism?
(A) tetrahydrobiopterin (B) formyl-tetrahydrofolate
(C) methyl-tetrahydrofolate (D) biotin
(E) S-adenosylmethionine

72. Which of the following statements regarding yeast two-hybrid analysis is **false**?
(A) The goal is to bring together the DNA-binding domain and the activation domain of the yeast Gal4 protein.
(B) Gal4 protein has two domains: one that binds a specific DNA sequence domain, the other activates RNA polymerase to synthesize tRNA from an adjacent gene (reporter gene).
(C) A library can be set up to fuse to the Gal4 protein DNA-binding domain.
(D) The interacting protein can be quickly identified by DNA sequencing of the fusion protein′s gene.
(E) Some false positive results occur, due to the formation of multiprotein complexes.

73. What amino acid residues in some membrane-associated proteins are covalently linked to myristoyl or farnesyl groups?
(A) asparagine and lysine (B) cysteine and glycine
(C) serine and tyrosine (D) asparagine and serine
(E) proline and lysine

74. What main component in plasma membrane has the oligosaccharide head groups to determine human blood types (O, A, B, and AB)?
(A) caveolin in lipid raft (B) clathrin in apical surface
(C) sphingolipid (D) phospholipid
(E) cholesterol

75. What enzyme is frequently used for the measurement of the concentrations of glucose in blood?
(A) glucokinase (B) glucose epimerase
(C) glucose dehydrogenase (D) glucose dehydration
(E) glucose oxidase

76. What two classes of enzymes play an important role in generating and propagating a recombinant DNA molecule in DNA cloning?
(A) recombinases and DNA polymerase α
(B) recombinases and DNA polymerase γ
(C) restriction endonucleases and DNA ligases
(D) restriction endonucleases and recombinases
(E) restriction endonucleases and reverse transcriptase

77. Insulin exerts its action through plasma membrane receptors to regulate the level of blood glucose. An elevated insulin level in the blood _____.
(A) results from a below-normal blood glucose level
(B) inhibits glycogen synthesis in liver and muscle
(C) stimulates synthesis of fatty acids in liver and triacylglycerols in adipose tissue
(D) inhibits glucose uptake by liver
(E) stimulates glycogen breakdown in liver

78. Which of the following statements regarding polysaccharide is **correct**?
(A) The glucose residues are linked by (β1→4) glycosidic bonds in cellulose.
(B) In bacteria, dextrans are made up of (α1→4)-linked poly-D-glucose.
(C) Chitin is a linear heteropolysaccharide composed of N-acetylglucosamine.
(D) Glycogen is a polymer of glucoses with (α1→4)-linked branches.
(E) Amylose is a branched glucose polymer.

79. Which of the following amino acids belong to ketogenic and glucogenic?
(a) Trp (b) Phe (c) Tyr (d) Arg (e) Met
(A) (a) (c) (e) (B) (a) (b) (c)
(C) (b) (c) (e) (D) (b) (d) (e)
(E) (a) (d) (e)

80. Which of the following statements regarding biosynthesis of fatty acids is **correct**?
(A) NADH is required in the biosynthesis of fatty acids.
(B) Fatty acids synthase I in vertebrates consists of 4 polypeptide chains.
(C) Fatty acids synthase I is not a homodimer molecule.
(D) HCO_3^- is involved in biosynthesis of fatty acids.
(E) There are 8 active sites in fatty acids synthase I.

81. Which of the following statements about Klenow fragment is **false**?
(A) Klenow fragment is derived from *E. coli* DNA polymerase I.
(B) It contains DNA polymerase activity.
(C) It contains 3'→5' exonuclease activity.
(D) Klenow fragment is derived from large fragment of *E. coli* RNA polymerase I.
(E) It is lack of 5'→3' exonuclease activity.

82. Which of the following statements regarding β-oxidation of fatty acids is **correct**?
(A) 16 acetyl-CoA molecules are produced by β-oxidation of palmitate.
(B) One acetyl group is removed in one turn of β-oxidation.
(C) In β-oxidation, ATP can be produced.
(D) CO_2 is generated by β-oxidation of palmitate.
(E) The β-oxidation of unsaturated fatty acids has 4 basic steps.

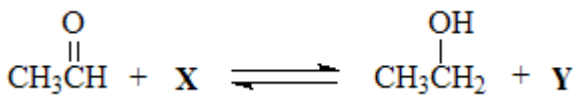
83. Chartgraff's rules for DNA state that:
(A) G+C = 39-46% in mammals
(B) A=T and G=C
(C) the sense strand is a right-handed helix
(D) A=U and G=C
(E) the minor groove is shallower than the major groove

84. Which of the following is a ribonucleoprotein required for the delivery of membrane and secretory proteins to the endoplasmic reticulum?
(A) small ubiquitin-related modifier (SUMO) (B) signal recognition particles (SRP)
(C) trigger factor (D) protein-conducting channel (PCC)
(E) calnexin

85. Transcriptional activators that have variable positions and orientations are called _____.
(A) enhancers (B) operators (C) introns (D) polycistrons (E) promoters

86. The peptide QYDG has a N-terminal _____ residue.
(A) glutamic acid (B) glycine (C) glutamine (D) aspartic acid (E) alanine

87. The reaction below is catalyzed by yeast alcohol dehydrogenase. Which of the following corresponds to X and Y?



(A) **X** = NAD + H^+ **Y** = $NADH^+$
(B) **X** = NADH + H^+ **Y** = NAD^+
(C) **X** = NADPH + H^+ **Y** = $NADP^+$
(D) **X** = NAD^+ **Y** = NADH + H^+
(E) **X** = $NADH^+$ **Y** =NAD + H^+

88. In *E. coli*, base-pairing between a mRNA's _____ and the 3' end of the 16S rRNA permits the ribosome to select the proper initiation codon.
(A) 5' cap (B) Shine–Dalgarno sequence
(C) poly(A) tail (D) start codon
(E) initiation factor

89. Chymotrypsin, a serine protease, preferentially cleaves a peptide bond adjoining a bulky non-polar side chain. This is because chymotrypsin's specificity pocket _____.
(A) is mostly filled with large side chains
(B) contains a negative charge
(C) contains a positive charge
(D) contains a sulfhydryl group that forms a disulfide bond with the substrate
(E) is lined with small hydrophobic side chains, leaving considerable room in the nonpolar pocket

90. Oseltamivir (marketed as Tamiflu) has a structure mimicking _____, and thus is a strong inhibitor of neuraminidase of H1N1 influenza virus.
(A) sialic acid (B) hyaluronic acid (C) sucrose (D) chondroitin sulfate (E) lactose