國立屏東科技大學八十九學年度碩士班招生考試　生　物　化　學 試題

選擇題 （單一選擇）：

1. 下列何種 amino acid 在氮代謝(nitrogen metabolism)中扮演中樞者?
   a. glycine　b. glutamate　c. tryptophan　d. histidine　e. phenylalanine

2. Pyridoxal phosphate (vitamin B_6 衍生物) 爲下列何種反應的 coenzyme?
   a. transamination　b. reductive amination　c. nitrogen fixation
   d. methylation　e. salvage pathway for nitrogen bases

3. urea cycle 之何種產物爲 citric acid cycle 之 intermediate:
   a. a-ketoglutarate　b. aspartate　c. oxaloacetate　d. fumarate　e. citrate

4.血中游離脂肪酸以何種方式運送至肌肉細胞:
   a. in the form of micelles　b. with the help of bile salts　c. bound to hemoglobin
   d. bound to the blood protein, serum albumin　e. in the form of the carnityl ester

5. 一飽和脂肪酸 C16：0 經幾次 β-oxidation 可完全轉換爲 acetyl CoA?
   a. 8　b. 7　c. 4　d. 16　e. β-oxidation 次數與脂肪酸碳數目無關

6. 人無法進行下列何種轉換
   a. carbohydrates into fats　b. fats into glucose　c. amino acids into fats
   d. amino acids into glucose　e. glucose into amino acids

7. 下列何者爲 ketone bodies
   a. β-hydroxy-β-methylglutaryl CoA　b. acetoacetate　c. acetone
   d. β-hydroxybutyrate　e. acetoacetate, acetone, and β-hydroxybutyrate

8. 細胞何處負責進行 NADH 與 $FADH_2$ 之再循環 （recycling）：
   a. glyoxysomes　b. mitochondria　c. ribosomes　d. endoplasmic reticulum　e. cytoplasm

9. 呼吸作用所消耗的氧(O_2) 被轉換爲:
   a. CO　b. CO_2　c. H_2O　d. hemoglobin　e. CO and CO_2

10. 下列何者不是電子傳遞鏈（electron transport chain）的氧化還原中心（redox center）?
   a. flavin mononucleotide (FMN)　b. iron-sulfur clusters　c. ubiquinone (CoQ)
   d. hemoglobin　e. cytochromes

11. 電子傳遞鏈中一對電子的傳送途徑爲:
   a. NADH →complex I →CoQ →complex III →cyt c→complex IV→O_2
   b. $FADH_2$ →complex I →CoQ →complex III →cyt c →complex IV →O_2
   c. NADH →complex I → complex II →complex III →cyt c →complex IV →O_2
   d. $FADH_2$ →complex II → CoQ →complex III →cyt c →complex IV →O_2
   e. NADH →complex I →CoQ →complex III →cyt c →complex IV →O_2 and
      $FADH_2$ →complex II → CoQ →complex III →cyt c →complex IV →O_2

背面有試題

12. 下列何種情況電子傳遞仍能進行

a. in the presence of 2, 4-dinitrophenol　　b. in the presence of antimycin A
c. in the presence of thermogenin　　d. in the presence of CO
e. in the presence of 2, 4-dinitrophenol and in the presence of thermogenin.

13. citric acid cycle 之主要目的爲:

a. synthesis of citrate and gluconeogenesis.
b. degradation of acetyl CoA to produce energy and supply of precursors for biomolecules.
c. degradation of pyruvate to produce energy and supply of precursors for biomolecules.
d. degradation of glucose to produce energy and supply of precursors for biomolecules.
e. synthesis of citrate and gluconeogenesis and degradation of glucose to produce energy and supply of precursors for biomolecules

14. 下列何者不是 citric acid cycle 的 intermediate?

a. a-ketoglutarate　b. succinate　c. pyruvate　d. citrate　e. oxaloacetate

15. 人類以何種碳水化合物作爲能量的儲存?

a. glycogen　b. amylose　c. amylopectin　d. cellulose　e. cellobiose

16. Gluconeogenesis 主要發生在

a. muscles　b. brain　c. heart　d. pancreas　e. liver

17. DNA fragment (double strands)：5'TGCGAATTCATGC3' 以 EcoR1(專一切割位置 G↓AATTC)處理後，其產物爲
3'ACGCTTAAGTACG5'　C TTAA↑G

a. 5'　　AATTC3'
   3'　TTAA　　G5'

b. 5'　TGCG　　AATTCATGC3'
   3'　ACGCTTAA　　GTACG5'

c. 3'　TGCG　　AATTCATGC5'
   5'　ACGCTTAA　　GTACG3'

d. 5'　TGCG　AATT　CATGC3'
   3'　ACGC　TTAA　GTACG5'

e. 5'　TGCG　　AATTCATGC3'
   3'　ACGCTTAA　　GTACG5'　and

   5'　ACGCTTAA　　GTACG3'
   3'　TGCG　　AATTCATGC5'

18. 用來尋找基因片段 5'TTGGTACAA，可以用下列那一個 RNA probe：:

a. 5'TTGGTACAA3'　b. 3'TTGGTACAA5'　c. 3'AACCAUGUU5'
d. 5'UUGGUACAA3'　e. 3'UUGGUACAA5'

19. 下列何者不是 recombinant DNA techniques 所必需的?

a. restriction enzymes　b. proteases　c. DNA fragment　d. plasmid　e. DNA ligase.

20. 下列何者不是 plasmids 的特徵?
    a. self-replicating, extrachromosomal DNA molecules
    b. closed circular structure.
    c. imparts special traits, such as antibiotic resistance, to bacteria
    d. linear double-stranded DNA
    e. useful cloning vectors

21. restriction enzymes 進行的反應爲:
    a. hydrolysis　b. redox　c. ligation　d. isomerization　e. phosphoryl group transfer.

22. vector 是:
    a. the DNA molecule that serves as the carrier for the foreign DNA to be introduced into a host organism.
    b. the foreign DNA fragment　c. the recombinant or hybrid DNA molecule.
    d. the host cell that reproduces the recombinant DNA.
    e. the foreign DNA fragment and the recombinant or hybrid DNA molecule.

23. 所謂 plasmid 的 restriction map 是指:
    a. displays the sites of cleavage by several restriction endonucleases and the number of fragments obtained after digestion with each enzyme.
    b. is of value in the selection of plasmids for cloning and for characterization of recombinant DNA molecules by fragment analysis.
    c. shows the location of marker genes.　d. is unique for each plasmid.　e. all of the above.

24. 下列何者可以與 cohesive end： 5' GTC / 3' CAGAATG 結合？
    a. 5'GTC / 3'CAGAATG
    b. TTACATG3' / TAC5'
    c. 5'TACTG / 3'ATGAC
    d. 5' ATGACG / TGC3'
    e. none of the above

25. polymerase chain reaction (PCR) 循環的三步驟(i)加熱至 95℃經 15 秒 (ii)快速降溫至 37-55℃, (iii)加熱至 72℃約 15 秒. 有關上述循環何者敘述有誤.
    a. step (i) causes denaturation of the Taq DNA polymerase.
    b. step (i) causes denaturation and separation strands of template DNA.
    c. step (ii) allows hybridization of primers with templates.
    d. Taq DNA polymerase produces new strands of DNA during step (iii).
    e. step (i) causes denaturation and separation strands of template DNA and step (ii) allows hybridization of primers with templates.

26. Ribsomes 是:
    a. are composed of two subunits.
    b. move along mRNA templates translating the genetic code into proteins.
    c. match the mRNA codons with anticodons of tRNA molecules charged with amino acids.
    d. catalyze the formation of peptide bonds between amino acids using energy from ATP or GTP.
    e. all of the above.

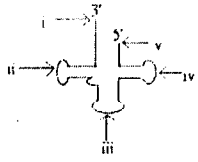
背面有試題

27. 下列有關 protein biosynthesis 敘述何者有誤?
   a. translation can be divided into three stages: initiation, elongation, and termination.
   b. mRNA is translated from the 3'end of the initiation codon to the 5'end of the termination codon.
   c. the growing polypeptide is synthesized from the amino terminal to the carboxyl terminal residue.
   d. a tRNA contains an anticodon which binds to a codon of mRNA that specifies the amino acid carried.
   e. ribosomes stabilize interactions between tRNAs and mRNA and provide catalysts for peptide bond formation.

28. codons 與 anticodons 之間的鍵結爲?
   a. H bonds　b. amide　c. acetal　d. peptide bonds　e. ionic bonds

29. tRNA 如何攜帶 amino acid:
   a. hydrogen bonding at the 3'end　b. an ester bond at the 3'end　c. an amide bond at the 5'end.
   d. hydrogen bonding at the codon end　e. hydrogen bonding at the anticodon end

30. 指出下圖中 anticodon 的位置:



   a. i　b. v　c. iii　d. ii　e. ii, iii, and iv

31. 每一個 aminoacyl-tRNA synthetase 可以辨識:
   a. its own specific tRNA molecule.
   b. its own specific amino acid.
   c. any tRNA that carries a related amino acid.
   d. its own specific tRNA molecule and its own specific amino acid.
   e. any tRNA and any amino acid that it happens to encounter.

32. 如果 genetic code 由倆個密碼子組成且具有專一性，則最多能辨識幾個 amino acids :
   a. 16　b. 2　c. 20　d. 40　e. genetic code 與 amino acids 無關.

33. CGU 爲 Arg 六種 genetic codons 之一。根據 wobble hypothesis 下列何者可能爲 Arg 的 codons?
   a. CGC, CGA, CGG　b. UUC, UUA, UUG　c. CUC, CUA, CUG
   d. GUC, UCG, CAU　e. none of the above

34. 下列何者不在蛋白質生成 (protein synthesis) 的 initiation 步驟中 :
   a. the 70S complex　b. release factors.　c. mRNA.　d. initiation factors and GTP
   e. fMet-tRNA.

35. 蛋白質生成(protein synthesis)的 termination step 中，release factors:
   a. bind to the P site.　　b. bind to the A site.
   c. catalyze hydrolysis of the ester bond of peptidyl-tRNA.
   d. dissociation of the 70S ribosome into 30S and 50S subunits.
   e. hydrolysis of the mRNA.

36. 蛋白質的 Signal sequences:
   a. mark the proteins for specialized processing or a specific destination.
   b. are usually removed by proteolysis after the protein has been modified.
   c. are employed by bacteria to relay chemical messages to each other.
   d. are found only in bacterial proteins.
   e. mark the proteins for specialized processing or a specific destination and are usually removed by proteolysis after the protein has been modified.

37. Helicase 是:
   a. uses ATP to catalyze the unwinding of the DNA double helix.
   b. is required to keep DNA in the double helix form.
   c. uses ATP to keep DNA in the double helix form.
   d. stabilizes single stranded DNA.
   e. is required to keep DNA in the double helix form and uses ATP to keep DNA in the double helix form.

38. SSB (single-strand DNA binding) proteins:
   a. stabilize and protect unwound DNA from damage.
   b. catalyze the unwinding of the DNA double helix.
   c. are responsible for repair of DNA.
   d. catalyzes ATP-dependent phosphate ester formation between two strands of DNA.
   e. are responsible for repair of DNA and catalyzes ATP-dependent phosphate ester formation between two strands of DNA.

39. DNA template strand：3'CATTCAG5'， 轉錄(transcription)所得之 RNA 爲:
   a. 5'CAUUCAG3'　　b. 3'CAUUCAG5'　　c. 5'GUAAGUC3'
   d. 3'GUAAGUC5'　　e. 5'GTAAGTC3'

40. DNA coding strand：3'CATTCAG5'，轉錄(transcription)所得之 RNA 爲:
   a. 5'CAUUCAG3'　　b. 3'CAUUCAG5'　　c. 5'ACUUACA3'
   d. 3'GUAAGUC5'　　e. 5'GTAAGTC3'

41. 有關 RNA polymerase 的敘述，何者有誤:
   a. it requires a DNA template.　　b. it requires a DNA primer.
   c. it elongates the newly formed RNA chain in the 5'→ 3'direction.
   d. it requires NTP to synthesize new RNA.　　e. it does not have any proof reading functions.

背面有試

42. 轉錄作用（transcription）中:
   a. RNA polymerase holoenzyme binds the promoter region forming a transcription bubble.
   b. σ (sigma) subunit dissociates from RNA polymerase after transcription begins.
   c. chain elongation takes place in the 5'→ 3'direction.
   d. ρ (rho) protein disrupts the RNA-DNA hybrid, thus terminating transcription.
   e. all of the above activities take place.

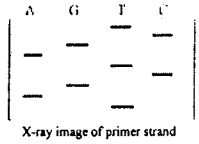
43. DNA 複製作用(replication):
   a. is semiconservative.
   b. is conservative.
   c. produces single stranded RNA complementary to the template strand.
   d. produces double stranded RNA.
   e. is discontinuous.

44. 轉錄作用（transcription）中:
   a. requires DNA polymerase III.
   b. requires RNA polymerase.
   c. produces single stranded RNA complementary to the coding strand.
   d. produces double stranded DNA.
   e. is discontinuous.

45. 染色體的 Telomeres 被認爲是 biological clocks，是由於:
   a. telomeres shorten with each cell cycle till they are too short to serve as substrates for telomerases (enzymes that lengthen telomeres) eventually ending in cell death.
   b. telomerase activity has been observed in 85% of cancers.
   c. cancer cells and sperm cells have telomerase activity.
   d. inhibitors of telomerase activity may prove to be effective anticancer agents.
   e. telomerase activity has been observed in 85% of cancers and inhibitors of telomerase activity may prove to be effective anticancer agents.

46. 雞白蛋白（ovalbumin）組成約 600 amino acids ，其 mature mRNA(不包括 poly A tail)應有多少 nucleotides:
   a. 600　　b. 7700　　c. 1872　　d. 1200　　e. 300

47. 以 Sanger chain-termination method 定序一 DNA，電泳膠片結果如下圖，則此 DNA 序列爲何？



X-ray image of primer strand

   a. 5'AAGGTTTCC3'　　b. 5'CCTTTGGAA3'　　c. 5'AGCTAGCTA3'
   d. 5'TCGATCGAT3'　　e. 無法判讀其 DNA 序列

48. 下列序列何者應該不是 type II restriction enzymes 的 cleavage sites?

a. 5'GAATTC3'　b. 5'CATATG3'　c. 5'CATTAG3'

d. 5'CAATTG3'　e. 5'TGGCCA3'

49. Cellulose 爲何者之聚合物(polymer)？

a. α-D-glucose　b. β-D-glucose　c. α-D-glucosamine

d. sucrose　e. both α-D-glucose and α-D-glucosamine

50. 下圖爲一健康者及一患病兩週病人的 lactate dehydrogenase isozymes 蛋白質電泳圖 (protein electrophoresis)，下列敘述何者有誤?

	Relative fluorenscence intensity of LDH isozymes				
	H_4 (heart)	H_3M	H_2M_2	HM_3	M_4 (liver)
Normal person	1.8	2.5	1.5	0.5	0.8
Patient on day 1	2.8	2.5	1.5	0.5	0.8
Patient on day 7	3.0	2.5	1.5	0.5	2.2
Patient on day 14	1.9	2.5	1.5	0.5	2.5

a. Patient on day 1 was suffering from damage to the heart muscle

b. Patient on day 7 was suffering from liver damage.

c. Patient on day 7 was still suffering from heart damage.

d. Patient on day 14 had recovered from heart damage.

e. Patient on day 14 had recovered from liver damage.