

國立彰化師範大學九十六學年度碩士班招生考試試題

系所：生物學系

科目：普通生物學(一)

請在答案紙上作答

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一. 選擇題：(15 分)

- () 1. A plant that is self-incompatible has a genotype of S_1S_3 for the S-locus. It receives pollen from a plant that is S_3S_4 . Which of the following is most likely to occur? A) All of the pollen will germinate, forming pollen tubes B) None of the pollen will germinate C) About half of the pollen will germinate D) Fertilization will occur in all of the flowers of the pollinated plant (E) Pollen from the S_3S_4 plant will secrete ribonuclease that destroys epidermal cells of the S_5S_9 stigma.
- () 2. The signal for flowering could be released earlier than normal in a long-day plant experimentally exposed to flashes of A) Far-red light during the night B) Red-light during the night C) Red-light followed by far-light during the night D) Far-red light during the day (E) Red-red light during the day.
- () 3. Which of the following structure-function pairs is mismatched? A) nucleolus; ribosome production B) lysosome; hydrogen peroxide degradation C) ribosome; protein synthesis D) Golgi; protein trafficking (E) microtubule; vesicle migration.
- () 4. Which of the following statements is a correct distinction between cyclic and noncyclic electron flow? A) only noncyclic electron flow produces ATP B) in addition to ATP, cyclic electron flow also produces O_2 and NADPH C) only cyclic electron flow utilizes light at 700 nm D) chemiosmosis is unique to noncyclic electron flow (E) only cyclic electron flow can operate in the absence of PS II.
- () 5. "Golden Rice" is a transgenic variety that A) is resistant to various herbicides, making it practical to weed rice fields with those herbicides B) is resistant to a virus that commonly attacks rice fields C) includes bacterial genes that produce a toxin that reduces damage from insect pests. D) produces much larger, golden grains that increase crop yields (E) contains daffodil genes that increase the vitamin A content.

二. 問答題：(10 分)

1. 一般我們所熟知的 NADH 與 NADPH 分別在植物細胞之何處形成？其功能分別是什麼？
2. 何謂乙烯的 "triple response"？其生理功能是什麼？

三、名詞解釋 (簡潔回答以下專有名詞，每題 2 分)。

1. Hepatic portal system
2. Non-steroidal anti-inflammatory drugs (NSAIDs)
3. Non-insulin dependent diabetes
4. Renin-angiotensin-aldosterone system
5. Reciprocal innervation
6. Atrial stretch reflexes
7. Tidal volume
8. Cross bridge cycle

四、簡答題 (9 分)

簡述胃功能調節的三個階段: a. 腦期 (cephalic phase), b. 胃期 (gastric phase), c. 腸期 (intestinal phase)

五、Tris buffer 是生物學實驗中常用的緩衝液，Tris base 的化學式為 $NH_2C(CH_2OH)_3$ ， pK_a 為 8.1，適用的 pH 範圍為 7.0-9.1，配製時通常以 HCl 水溶液調整 Tris buffer 至所需要的 pH 值。假設你必須配製 1 公升的緩衝溶液，其成份為含有 500 mM Tris 與 25 mM EDTA 的水溶液，其 pH 值為 8。使用的材料為 Tris base 粉末一罐，1N HCl 水溶液一瓶，500 mM EDTA 水溶液一瓶 (pH = 8.0)，電動天平一台，pH meter 一台，以及實驗室中常用的各種玻璃容器。詳細描述你配製此溶液的過程，請務必將配製過程中出現的數字 (如秤取藥品的重量，量取液體的體積) 明確地寫出。(25 分)

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六、單選題:每題二分

1. ____ Which of the following is not involved in the initiation of protein synthesis in *E. coli*? A) mRNA, B) IF, C) tRNA^{Met}, D) ribosomes.
2. ____ The synthesis of peptide in protein synthesis is catalyzed by A) terminal transferase, B) peptidyl transferase, C) elongation factor, D) translocase.
3. ____ How does the 40S subunit of a ribosome locate an initiation codon on an mRNA molecule? A) it recognizes a sequence called “Kozak sequence”, B) it recognizes the cap site of mRNA, C) it contains a sequence of CCUCCUUA, which can bind to the initiation signal of mRNA, D) it contains a sequence called “Shine-Dalgarno sequence”, which can bind to the initiation signal of mRNA.
4. ____: The sequence of a RNA is AUGAUUACA. What is the sequence of its DNA template? A) ATGATTACA; B) TACTAATGT; C) TGTAATCAT; D) ACATTAGTA.
5. ____: The following sequence UAGDCGGDAG belongs to A) mRNA; B) tRNA; C) rRNA; D) snRNA.
6. ____: What is the right sequence of the conformations of chromatin fibers from least condensed to most condensed? A) chromosome solenoid beads-on-a-string nucleosome; B) nucleosome beads-on-a-string solenoid chromosome; C) chromosome beads-on-a-string solenoid nucleosome; D) nucleosome solenoid beads-on-a-string chromosome.
7. ____: What is the wobble position during protein synthesis? A) the first position of a codon; B) the first position of an anticodon; C) the first position of a codon; D) none of above.
8. ____: The bacterial RNA polymerase consists of a core enzyme ($\alpha 2\beta\beta'$) and a sigma factor (σ). If we treated the enzyme with an antibiotic (rifamycin), the activity of a subunit β was inhibited by preventing initiation of transcription, prior to the formation of the first phosphodiester bond. So the function of the β subunit is A) binding of template DNA; B) binding of nucleotide substrate; C) promoter recognition; D) control of the binding of RNA polymerase to the promoter region.
9. ____: Which of the following is not true of *trp* operon in *E. coli*? A) It is a repressible operon involved in catabolism.; B) It involves one repressor gene and five structural genes.; C) The tryptophan is an co-repressor of the operon; D) A sequence located between the operator and the first structural gene *trpE* is called attenuator, which controls the movement of RNA polymerase depending upon the presence or absence of tryptophan.
10. ____: Which of the following RNAs is not transcribed by RNA polymerase III in eukaryotes? A) tRNA; B) 5.8S rRNA; C) 5S rRNA; D) snRNA.

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七、填充題:請將正確答案填於空格內

		Second base				
		U	C	A	G	
First base	U	UUU } Phe UUC } UUA } Leu UUG }	UCU } UCC } Ser UCA } UCG }	UAU } Tyr UAC } UAA Stop UAG Stop	UGU } Cys UGC } UGA Stop UGG Trp	U C A G
	C	CUU } CUC } Leu CUA } CUG }	CCU } CCC } Pro CCA } CCG }	CAU } His CAC } CAA } Gln CAG }	CGU } CGC } Arg CGA } CGG }	U C A G
	A	AUU } AUC } Ile AUA } AUG Met start	ACU } ACC } Thr ACA } ACG }	AAU } Asn AAC } AAA } Lys AAG }	AGU } Ser AGC } AGA } Arg AGG }	U C A G
	G	GUU } GUC } Val GUA } GUG }	GCU } GCC } Ala GCA } GCG }	GAU } Asp GAC } GAA } Glu GAG }	GGU } GGC } Gly GGA } GGG }	U C A G

(圖取自 <http://www.web-books.com/MoBio/>)

Above is the table of genetic code. Given the sequence of a template strand of a gene is 5'ACCTCAAGTGAAGTACCGTACCATCTG3'. The sequence of its mRNA is 5' _____ 3' (二分), and its encoded amino acid sequence is _____ . (三分)