所別：生命科學系碩士班 醫藥與環境生物科技組(一般生) 科目：普通生物學
(學位在職生)

壹：簡答

1. 請簡述下列胞器的生理功能 (12 分)：
   a. Cytoskeleton
   b. Flagella
   c. Golgi apparatus
   d. Vacuole
   e. Lysosome
   f. Chloroplast

2. 請就下列項目辨述原核生物與真核生物的差異 (10 分)：
   a. Cell size
   b. Multicellularity
   c. Chromosomes
   d. Cell division and genetic recombination
   e. Internal compartmentalization

3. 試分別以植物的葉肉細胞與動物的紅血球細胞爲例，說明細胞處於低張 (hypotonic) 及高張 (hypertonic) 溶液中，可能產生之現像。 (10 分)

4. 多細胞真核生物可由單一細胞經過分裂及分化的過程發育而成。試就植物的組織培養及動物的幹細胞，說明何謂 totipotency ？何謂 pluripotency？(10 分)

5. 細菌有所謂的質體 (Plasmid)，是分子遺傳工程用以承接基因的載體。假設質體 A 只能存在細菌 A，質體 B 只能存在細菌 B，質體 C 卻能存在細菌 A 與細菌 B。對於質體 A、B、C 之間差異的可能解釋爲何？(5 分)

6. 請就單倍體 (haploid) 及雙倍體 (diploid) 的角度，解釋維管束植物的世代交替 (alternation of generation)。(5 分)

貳：單選題（每題只有一個答案）；每題四分

1) Which of the following organelles has bilayer of phospholipid membranes, ATP-conversion enzymes, and ribosomes similar to those found in bacteria?
(A) Peroxisome (B) Smooth endoplasmic reticulum (C) Lysosome (D) Rough endoplasmic reticulum (E) Mitochondrion

2) In vascular plants, DNA is contained in which of the following? I. Mitochondrion, II. Chloroplast, III. Nucleus
(A) II only (B) III only (C) I and III (D) II and III (E) I, II, and III

3) When DNA is isolated from *E. coli* and assayed the base composition, it is found that 12% of the bases are adenine. What percentage of the bases are cytosine?
(A) 12% (B) 24% (C) 38% (D) 62% (E) 76%

注意：背面有試題

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4) The distribution of transmembrane proteins in the cellular membrane can be visualized by what kind the following techniques?
(A)Freeze-fracture electron microscopy (B) Native-gel electrophoresis (C) Thin-section electron microscopy (D) Scanning electron microscopy (E) TTC staining

5) All of the following cellular activities involve in actin filaments **except**
(A) amoeboid movement (B) flagellar movement in bacteria (C) contraction in smooth muscle (D) cytokinesis (E) cytoplasmic streaming

6) In prokaryotic cell system, induction of the *lac* operon occurs when allolactose binds to
(A) the open reading frame (B) the enhancer (C) the repressor (D) the promoter (E) the operator

7) Which of the following statements about the short sequences of repetitive human DNA is correct
(A) Repetitive DNA is responsible for the production of key proteins involved in respiration
(B) Highly repeated sequences rapid reassociate in DNA hybridization studies
(C) Most of the repetitive DNA is transcribed into transfer RNA
(D) Most repeated sequences have effects on phenotypes
(E) Much of the repetitive DNA codes for the proteins about apoptosis

8) Mitochondria and chloroplast carry out oxidative phosphorylation and photophosphorylation, respectively, by means of
(A) conformational coupling
(B) chemiosmotic coupling
(C) photorespiration
(D) catalytic reaction
(E) replication

9) Blood fibrinogen is converted into fibrin during
(A) carbon dioxide/oxygen exchange
(B) glucose regulation
(C) clot formation
(D) a fever condition
(E) an immune response

10) What kind of vitamin plays an important role in formation of collagen and the prevention of scurvy
(A) thiamin (B) pyridoxine (C) nicotinic acid (D) ascorbic acid (E) tocopherol

11) As regard human height, the production of short individuals by two normal-sized parents is best explained by
(A) point mutation (B) sexual reproduction (C) inheritance linkage (D) epistasis (E) polygenic inheritance

12) Which of the following genotypes would produce the greatest combination of gametes if the alleles assorted independently
(A) aabbccdd
(B) aaBBCCDD
(C) AAbbCcDd
(D) AaBBCcDd
(E) AAbbccDd