招生學年度	104	招生類別	碩士班
系所班別	生命科學系 生物技術碩士班		
科目名稱	生物學		
注意事項	本考科禁止使用掌上型計算機；以細胞生物學、分子生物學及生物化學相關基礎為主。		

I. 單選題 (75 分, 每題 3 分)

1. Which organelle is the primary site of ATP synthesis in eukaryotic cells?
   (1) lysosome (2) vacuole (3) mitochondrion (4) Golgi apparatus
2. What kinds of molecules pass through a cell membrane easily?
   (1) large and hydrophobic (2) small and hydrophobic (3) large polar (4) ionic
3. Upon ligand binding, receptor tyrosine kinases (RTKs) undergo the following events ***except***?
   (1) receptor dimerization. (2) phosphorylation at the cytosolic domain.
   (3) inactivation of kinase activity. (4) recruit the adaptor or signaling proteins
4. Taxol (紫杉醇) is an anticancer drug. In animal cells, Taxol disrupts microtubule formation by binding to microtubules and inhibits mitosis. Thus, Taxol must affect:
   (1) the formation of the mitotic spindle. (2) anaphase.
   (3) formation of the centrioles. (4) chromatid assembly.
5. The depolarization phase of the action potential is generated by a rapid _____.
   (1) opening of Na+ channels (2) closure of K+ channels
   (3) closure of Na+ channels (4) opening of K+ channels
6. White blood cells "eat" bacteria through what process?
   (1) phagocytosis (2) pinocytosis (3) osmosis (4) receptor-mediated exocytosis
7. A steroid hormone is bound by an intracellular receptor. When it does, the resulting complex is most likely to do which of the following?
   (1) open channels in the membrane for other substances to enter
   (2) open channels in the nuclear envelope for cytoplasmic molecules to enter
   (3) mediate the transfer of phosphate groups from ATP
   (4) act as a transcription factor in the nucleus
8. Vesicles carrying proteins for secretion move between ER and the
   (1) smooth ER (2) lysosomes (3) Golgi apparatus (4) cell membrane
9. The metabolic process that produces the most ATP molecules is
   (1) glycolysis (2) the citric acid cycle (3) the electron transport system (4) fermentation
10. Which of the following is ***not true*** of fermentation? Fermentation
    (1) has a net gain of only 2 ATP (2) occurs in the cytoplasm
    (3) donates electrons to the electron transport system (4) begins with glucose
11. A denatured protein has lost its?
    (1) hydrogen bonds (2) function (3) shape (4) all of the above
12. Unlike saturated fats, the fatty acid tails of unsaturated fats incorporate one or more?
    (1) phosphate groups (2) double bonds (3) glycerols (4) methyl group
13. Synthetic compounds that inhibit receptors by preventing the natural messenger from binding are known as

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(1) agonists. (2) antagonists. (3) promoters. (4) receptor upregulators.

14. Which of the following statements is ***wrong*** about G-protein coupled receptors (GPCRs)?
    (1) GPCRs can interact with G protein upon ligand binding.
    (2) Gα binds to GTP and detaches from the Gβγ subunits.
    (3) adenylate cyclase is activated by binding with Gα-GDP.
    (4) protein kinase A is activated by cAMP.
15. The oxygen required by cellular respiration becomes part of which molecule?
    (1) ATP (2) H_2O (3) pyruvate (4) CO_2
16. There are three types of cytoskeletons ***except***?
    (1) microtubules (2) collagens (3) microfilaments (4) intermediate filaments
17. Which of the following statements is ***wrong*** for describing apoptosis?
    (1) shrinking of cytoplasm and condensation of nucleus. (2) formation of apoptotic bodies.
    (3) significant inflammatory response. (4) affects individual cells.
18. In which phase of mitosis are the chromosomes moving toward to poles?
    (1) prophase (2) metaphase (3) anaphase (4) telophase
19. All the following elements can function as eukaryotic promoters ***except***
    (1) a TATA box (2) an initiator element (3) CpG islands (4) an enhancer
20. microRNAs play a key role in which of the following?
    (1) translational repression (2) viral RNA degradation (3) RNA interference (4) all of the above
21. Which following sequence is the complementary strand of this template DNA fragment (5'-TCAGGC-3')?
    (1) 5'-AGTCCG-3' (2) 5'-GCCTGA-3' (3) 5'-CGGACT-3' (4) 5'-TCAGGC-3'
22. Which is not a nucleotide base in DNA?
    (1) adenine (2) guanine (3) uracil (4) thymine
23. Which of following are removed from new mRNA transcripts?
    (1) introns (2) exons (3) amino acids (4) telomeres
24. The enzyme responsible for adding new nucleotides to a growing DNA chain during DNA replication is
    (1) helicase (2) RNA polymerase (3) DNA polymerase (4) ribozymes.
25. During protein synthesis, an anticodon of a transfer RNA (tRNA) pairs with
    (1) amino acids in the polypeptide (2) DNA nucleotide bases
    (3) ribosomal RNA (rRNA) nucleotide bases (4) messenger RNA (mRNA) nucleotide bases

II. 問答題 (25 分)

1. Describe the structure and functions of cell membrane **(15 分)**.
2. Describe how growth factors can stimulate the quiescent cells (in Go phase) re-entering the cell cycle. What molecular events occur after stimulation? **(10 分)**