

國 立 清 華 大 學 命 題 紙

98 學年度__生命科學院、生命科學院醫學生物科技學程__系(所)__甲__組碩士班入學考試

科目__生物學__ 科目代碼__0202、0502__共__3__頁第__1__頁 *請在【答案卷】內作答

I. Single choice (單選題, 2 points each, total 20%)

1. An immune complex resulting from an interaction of antibody with cells or particles which becomes large enough to settle out of solution is called a (n)
 - A. Agglutination reaction.
 - B. Precipitation reaction.
 - C. Hemagglutination.
 - D. Ouchterlony double diffusion.
 - E. All of choices.

2. A vaccination is a good example of
 - A. Naturally acquired passive immunity.
 - B. Naturally acquired active immunity.
 - C. Artificially acquired active immunity.
 - D. Artificially acquired passive immunity.
 - E. All of choices.

3. Which of the following is a disease of humans that is probably caused by a prion and was originally associated with cannibalism?
 - A. Scrapie.
 - B. Creutzfeld-Jakob Disease.
 - C. Kuru.
 - D. Scrapie and Creutzfeld-Jakob Disease.
 - E. Both scrapie and Kuru.

4. The protein coat surrounding the viral genome is called the
 - A. Capsule.
 - B. Capsid.
 - C. Matrix.
 - D. Envelope.
 - E. Spike.

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5. Organisms that grow well at 0°C and have optimum growth temperatures between 20°C and 30°C are called
- A. Hyperthermophiles.
 - B. Psychrotrophs.
 - C. Mesophiles.
 - D. Thermophiles.
 - E. Frigiphiles.
6. Which of the following is true about bacteria?
- A. Bacteria have a membrane-bound structure called nucleoid.
 - B. The size of a bacterial ribosome is 80S.
 - C. Some of bacteria have an actin-like protein called MreB which plays an important role in cytokinesis.
 - D. The membranes in bacteria contain cholesterol.
 - E. Some of bacteria have fimbriae for mating (conjugation).
7. An F' plasmid results when
- A. An integrated F plasmid is incorrectly excised, bringing host genes with it.
 - B. An F⁺ × F⁻ mating is interrupted before completion.
 - C. An Hfr × F⁻ mating is interrupted before completion.
 - D. None of the above is correct.
 - E. All of the above are correct.
8. Which of the following is not used as a means used by bacteria to increase cell number:
- A. Fragmentation of filaments into hormogonia.
 - B. Budding.
 - C. Formation of exospores.
 - D. Formation of endospores.
 - E. Binary fission.
9. Which of the following is not true about insertion sequences?
- A. Can move around the chromosomes within an organism.
 - B. Are relatively short (750 to 1,600 bp).
 - C. Contain only one gene encoding transposase.
 - D. Are discrete genetic elements with direct repeats at their ends.
 - E. Are widespread in bacteria, eukaryotes and archaea.

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10. Which is not true for the comparison of bacteria, archaea and eucarya?

- A. The *Archaea* lack membrane-enclosed nucleus with nucleolus.
- B. The *Archaea* have ether-linked, branched aliphatic chains in their membrane lipid.
- C. Messenger RNA splicing and capping are absent in the *bacteria*.
- D. The cell wall of the *Archaea* contains muramic acid.
- E. The *Eucarya* are insensitive to Rifampicin, which inhibits DNA-dependent RNA polymerase

II. 問答題

1. Explain leptin and obesity. (7 points)
2. Explain the B-cell receptor diversity. (8 points)
3. Why sea birds can drink sea water, but human cannot drink sea water? (7 points)
4. Describe the relationship between stress and the adrenal gland. (8 points)
5. Describe the function of oxytocin. (7 points)
6. Vertebrate photoreceptors hyperpolarize upon light stimulation, why? (8 points)
7. Explain Hamilton's rule and kin selection. (8 points)
8. Describe the logistic population growth model. (7 points)
9. Please describe the current model of cell membrane structure and the functions of cell membrane. (4 points)
10. Cells have evolved a set of complicated pathways for addition of carbohydrates to proteins, implying that carbohydrates serve some important function, yet for the most part these functions are not known. List three functions that carbohydrates on proteins are known to serve. (8 points)
11. Please describe how mitotic Cdk-Cyclin complex (MPF) controls both G2 checkpoint and spindle assembly checkpoint (8 points).