

※ 注意：全部題目均請作答於試卷內之「非選擇題作答區」，請標明題號依序作答。

1. Mitochondria are the major site of ATP production for cell survival and many vital cellular functions. Mitochondria also act as the central executioners of cell death including apoptotic and necrotic cell death. Therefore, mitochondrial quality must be well controlled to avoid cell death. Please discuss the multiple mechanisms underlying mitochondria quality control. (7%)
2. Please explain the microtubule organizing center (MTOC) and its function. (6%)
3. Exosomes are newly discovered organelles. Please discuss their possible functions. (6%)
4. EDTA is a divalent cation chelator. Please propose an explanation for the reason why EDTA promotes the dissociation of animal cells? (6%)
5. Address immunosuppressive cancer therapy using CTLA-4 or PD-1 as an example. (5%)
6. Describe the importance and regulators of spindle assembly checkpoint and spindle position checkpoint in cell cycle progression. (10%)
7. Briefly describe clathrin-mediated endocytosis. (5%)
8. Define the activation and regulation of Rho GTPases by Guanine nucleotide exchange factors (GEFs) and GTPase activating proteins (GAPs). (5%)
9. Describe, in sequential order, what happens to eukaryotic mRNA before it can be translated to protein (6 %).
10. Why is selenocysteine called the 21th amino acid when there are many more amino acids found than the 20 basic ones encoded by the genetic code (4%)?
11. (a) How does DNA replication in eukaryotes differ from the process in prokaryotes (4%)? (b) Describe the components and their functions that constitute the eukaryotic replisome (8%)? (c) Explain if you agree or disagree that replisome proteins are good targets for discovery of new antibacterial therapeutics (3%).

見背面

12. A high PSA (Prostate-specific antigen) level has been linked to an increased chance of having prostate cancer. PSA is an androgen receptor (AR)-responsive gene and depletion of androgens, either surgically or medically, to produce a castrated state is the standard first-line treatment for prostate cancer. Please describe the molecular mechanism of androgen-mediated PSA expression. (6%) Based on above androgen activation processes, please figure out the possible medical treatments for prostate cancer instead of depletion of androgens. (3%)
13. Please design experiments in biochemical and functional assays to demonstrate the PSA expression is regulated by androgen receptor. (8%)
14. Please describe the structure of E.coli lac operon and its regulation in the medium containing low glucose and high lactose. (8%)

試題隨卷繳回