

**Cell Biology (細胞學)**

- (25%) 1. Define the term "cell cycle". Explain the roles of the mitogen-activated protein kinases (MAPK), cyclin-dependent kinases, p53, and caspase-3 proteins in cell cycle control.
- (15%) 2. Define the term "cytoskeleton" and explain the respective role of the tubulin and myosin II proteins in sperm motility and smooth muscle cell contraction.
- (10%) 3. Give each example to list the major differences of the two main pathways, cotranslational import and posttranslational transport, for routing the newly forming polypeptide products begin to diverge.
- (10%) 4. How to prove that membrane proteins are oriented asymmetrically across the lipid bilayer and that the lipid bilayer is fluid?
- (20%) 5. Explain the roles of the nuclear pore complex (NPC), lamins, nucleolus organizer region, and telomerase in the nuclear activity.
- (20%) 6. Each of the following processes is associated with one or more specific eukaryotic organelles in animals. In each case, identify the cytoplasmic organelle or organelles, and suggest one advantage of confining the process to the organelle or organelles.
- (a)  $\beta$  oxidation of long-chain fatty acids
  - (b) biosynthesis of androgen
  - (c) biosynthesis of cyclin
  - (d) N-linked glycosylation of the integrin protein
  - (e) Degradation of damaged or no longer needed organelles