

香港中文大學  
The Chinese University of Hong Kong

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二〇〇四至二〇〇五年度上學期科目考試  
Course Examination 1<sup>st</sup> Term, 2004-2005

科目編號及名稱

Course Code & Title : BCH 2010 Cellular Basis of Biochemistry

時間	小時	分鐘
Time allowed :	hours	Minutes
2		

學生編號	座號
Student I.D. No. :	Seat No.:

Write your answers in the answer books. Answer Part I and II in separate answer books.

**PART I (60 marks)**

**SECTION A. True or false questions (10 marks): answer all questions (1 mark each).**  
**NOTE: 1 mark will be deducted for each wrong answer.**

True-False Questions not to be provided
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**SECTION B. Short questions (30 marks): answer any three questions (10 marks each).**

- B1. Briefly describe the functions of Rab proteins in vesicle trafficking.
- B2. Write short notes on gap junction.
- B3. Briefly describe the assembly and stability of tubulin protofilament.
- B4. Compare and contrast the vesicular transport model and cisternal maturation model.

**SECTION C. Essay questions (20 marks): answer either question.**

- C1. (a) (10 marks) Discuss the functions of SNAREs.
- (b) (10 marks) Speculate what will happen to the cell if the amount of one kind of t-SNARE is 10 times less than its complementary v-SNARE. Explain your answer.
- C2. (a) (10 marks) Compare and contrast the functions of COPI and Clathrin.
- (b) (10 marks) Protein X carries a signal sequence, nuclear localization signal and mannose-6-phosphate modification site. Predict the cellular transport route, and final destination of X. Explain your answer.

**PART II (40 marks): use a new answer book for this part.****SECTION D. Compulsory question (20 marks).**

- D1. Signal transduction cascades can be mediated by the adenylate cyclase, guanylate cyclase, phosphatidylinositol 4,5-bisphosphate or receptor tyrosine kinase. Discuss the common characteristics shared by these cascades. (*Compulsory*)

**SECTION E. Essay questions (20 marks): answer any two questions (10 marks each).**

- E1. (10 marks) Describe briefly the structure of eukaryotic nucleus and explain the importance of these structures for the normal functioning of the nucleus.
- E2. The box shown below is part of an abstract on cell cycle control and cancer.

**Cell cycle checkpoint control mechanisms that can be disrupted in cancer**

Maintenance of genomic integrity is essential to avoid cellular transformation, neoplasia, or cell death. DNA synthesis, mitosis, and cytokinesis are important cellular processes required for cell division and the maintenance of cellular homeostasis; they are governed by many extra- and intra-cellular stimuli. Progression of normal cell division depends on cyclin interaction with cyclin-dependent kinases (Cdk) and the degradation of cyclins before chromosomal segregation through ubiquitination. Many genes act as either positive or negative regulators of checkpoint function through different kinase cascades, delaying cell cycle progression to repair the DNA lesions and breaks, and assuring equal segregation of chromosomes to daughter cells. Understanding the checkpoint pathways and genes involved in the cellular response to DNA damage and cell division events in normal and cancer cells, provides information about cancer predisposition, and suggests design of small molecules and other strategies for cancer therapy.

Dash BC, El-Deiry WS. (2004). *Methods Mol Biol.* 280:99-161.

Briefly answer the following questions.

- (a) (2 marks) What is the meaning of "checkpoint"?
- (b) (6 marks) Explain briefly the role of cyclins and cyclin-dependent kinase on the checkpoint control.
- (c) (2 marks) Explain why multiple checkpoints can be found in the cell cycle in higher eukaryotes.
- E3. (10 marks) Briefly describe the structure, functions and components of the extracellular matrix in animals.

- End of Paper -