九十二學年度 生命科學院 甲 組碩士班研究生招生考試

科目 細胞生物學 科號 0806 共 2 頁第 1 頁 *請在試卷【答案卷】內作答

I. Select the one choice that best completes the statement or answers the question. (10%)

1) Which of the following cell junctions are associated with the proper alignment of intestinal epithelial cells?
   A) gap junctions
   B) adhesive junctions
   C) tight junctions
   D) desmosomes
   E) all of the above

2) In examining glucose transport into a cell, the immediate phosphorylation of glucose following its entry into the cell
   A) keeps the glucose from being transported back out of the cell.
   B) allows the cell to maintain higher levels of glucose outside the cell.
   C) puts glucose into a form for use in cellular respiration.
   D) puts glucose into a form to be stored.
   E) all of the above.

3) Of the proteoglycans associated with the extracellular maxtrix in vertebrates, which of the following is associated with the lubrication of joints?
   A) chondroitin sulfate
   B) glucuronate
   C) hyaluronate
   D) keratan sulfate
   E) mucoproteins

4) During receptor mediated endocytosis, the ultimate fate of the vesicle and/or its contents include(s)
   A) transcytosis.
   B) transport to late endosome for digestion.
   C) recycling of receptors
   D) both B and C
   E) choices A, B, and C

5) Based on your knowledge of the chemistry of the cell membrane, which of the following compounds would you couple with a new drug in order to achieve better uptake by cells?
   A) carbohydrates
   B) polar amino acids
   C) lipids
   D) several mannose-6-phosphate monomers
   E) any hydrophilic substance

II. Please answer the following questions. (90%)

1. Specific structural features tag proteins for transport to various intracellular and extracellular destinations. Two examples are (1) the short peptide KDEL at the C-terminus of protein and (2) mannose-6-phosphate residues attached to oligosaccharide side chains. For these **two** structural features, answer the following questions. (12%)
   (a) Where (which organelle) in the cell is the tag incorporated (added) into the protein?
   (b) What is the destination of the protein with the tag? How does the tag specify the destination of the protein?
   (c) If you generate cells expressing an artificial protein containing both of the above mentioned two tags, where will you predict its final destination in the cells? Please explain your prediction.

2. What kind of model is now the accepted view of membrane structure? Please **briefly** describe this model (You **must** and please **only** indicate (i) the main component(s) of the membrane related to the name of the model and (ii) the way of their distribution in this model). (4%)

3. What **is** the **main difference** of direct and indirect active transport? Please give the examples for these two kinds of active transport and **indicate the main difference** in the examples you provide. (8%)

4. 請說明爲何神經細胞的靜止膜電位(resting membrane potential) 應藉由 Goldman equation 而不是 Nernst equation 之計算而得出? (10%)

5. 請問動物細胞之 Adhesive junctions 與 Gap junction 的 associated structures 有何不同? 是否與其 functions 有關? (10%)

6. 請問爲何在絕大部份的體細胞無法觀察到形如 x 的染色體?爲何有些細胞要形成形如 x 的染色體? (10%)

7. Please explain the following terms: (36%)
   (a) Current model for cotranslational import of polypeptides into the ER lumen
   (b) How a 100 Kd transcription factor can be transported from the cytosol into the nucleus
   (c) G protein-linked receptor signal transduction pathway