

一、單選題 (每題 2 分)

1. Which one of following instruments can be used to observe membrane glycoproteins after freeze-fracture
 - a. Bright field microscope
 - b. Phase contrast microscope
 - c. DIC (Nomarski interference)
 - d. Fluorescent microscope
 - e. Confocal microscope
 - f. SEM
 - g. TEM

2. Which one of following instruments can be used to recombine the split beam in polarized light
 - a. Bright field microscope
 - b. Phase contrast microscope
 - c. DIC (Nomarski interference)
 - d. Fluorescent microscope
 - e. Confocal microscope
 - f. SEM
 - g. TEM

3. Which one of following instruments can be used to reconstruct 3-D images from light sectionings
 - a. Bright field microscope
 - b. Phase contrast microscope
 - c. DIC (Nomarski interference)

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- d. Fluorescent microscope
- e. Confocal microscope
- f. SEM
- g. TEM

4. N-linked glycosylation occurs at

- a. Ribosome
- b. RER
- c. SER
- d. Golgi complex
- e. Plasma membrane

5. Improperly made proteins aggregate in the cytoplasm and are destroyed by

- a. Phagocytosis
- b. Pinocytosis
- c. Microautophagy
- d. Macroautophagy
- e. Autolysis

6. The following steps occur when a white blood cell phagocytizes a bacterium. Which is the last step?

- a. A phagosome forms
- b. A secondary lysosome forms
- c. A residual body forms
- d. The bacterium binds to a receptor
- e. The phagosome fuses with a lysosome

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7. If a piece of chromatid breaks during metaphase, it will
- Stop in place
 - Attach to another microtubule
 - Move toward the nearest pole
 - Hybridize with other chromatids
 - None of above
8. Which of the following does not occur in anaphase?
- Nuclear lamin assembly
 - Shortening of microtubules
 - Elongation of microtubules
 - Two spindle poles move away from each other
 - Centromere division
9. A protein passing through the Golgi and lacking a specific targeting signal will go to the
- extracellular medium
 - mitochondrion
 - lysosome
 - peroxisome
 - nucleus
10. Axonal transport is not affected by
- colchicine
 - antitubulin

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- c. phalloidin
- d. taxol
- e. vinblastine

二、Label each of the statements below with an S if it is true of the smooth ER only, with an R if it is true of the rough ER only, with an RS if it is true of both, and with an N if it is true of neither. (8 分)

1. Consists of about 70% lipid and 30% protein by weight.
2. Is studded with ribosomes on the outer surface.
3. Is involved in the breakdown of glycogen.
4. Is the site of the initial steps in the addition of sugar groups to glycoproteins.
5. Is site of synthesis of secretory proteins.
6. Is site of synthesis of steroids.
7. Is site of synthesis of lipids.
8. Usually consists of flattened sacs.

三、Indicate whether each of the following statement is true of microtubules (MT), microfilaments (MF), intermediate filaments (IF), or none of these (N). More than one response may be appropriate for some statements. (10 分)

1. Involved in muscle contraction.
2. Involved in the movement of cilia and flagella.
3. More important for chromosome movements than for cell division.
4. More important for cytokinesis than for chromosome movements in animal cells.
5. Most likely to remain when cells are treated with solutions of nonionic detergents or high ionic strength.

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6. Found in bacterial cells.
7. Differ in composition in muscle cells versus nerve cells.
8. Can be detected by immunofluorescence microscopy.
9. Play well-documented roles in cell movement.
10. Assembled from protofilaments.

四、簡答 (每題 2 分)

Depict how cells are studied by using following techniques:

1. confocal microscopy
2. density gradient centrifugation
3. ELISA
4. enzyme cytochemical labeling
5. flow cytometry
6. fluorescence in situ hybridization
7. freeze fracturing
8. microscopic autoradiography
9. myosin decoration
10. patch clamp
11. pulsed-chase labeling

五、Embryogenesis is a step by step allocation of cells to more and more precisely determined fates. A. List major developmental stages chronologically during *Drosophila* embryogenesis. B. What is the chronological order of gene expressions of the five classes of pattern-control genes? (10 分)

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- 六、Discuss the roles of fertilization and ion fluxes in the mechanisms of fast block, slow block and egg activation in sea urchin. Start from initial contact of sperm and egg to the first division of the zygote. (10 分)
- 七、Depict the structure and function of major junctions between animal cells. (10 分)
- 八、Draw a picture to demonstrate possible crosslinking between collagen fibers, proteoglycans, hyaluronic acid, fibronectin, integrin. (10 分)