



UNIVERSITI KUALA LUMPUR
INSTITUTE OF MEDICAL SCIENCE TECHNOLOGY

FINAL EXAMINATION
MARCH 2025 SEMESTER

COURSE CODE : HDB10102
COURSE TITLE : CELL BIOLOGY
PROGRAMME NAME : BACHELOR OF BIOMEDICAL SCIENCE (HONOURS)
DATE : 26 JUNE 2025
TIME : 2:00PM - 5:00PM
DURATION : 3 HOURS



INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. This question paper consist of TWO sections.
4. Answer ALL questions for Section A.
5. Section B consist of four questions. Answer THREE (3) questions only.
6. Please write your answer on the answer booklet provided.
7. Please answer all questions in English only.
8. Please answer MCQ/EMQ questions using OMR sheet. *Tick if applicable*
9. Refer to the attached Formula/ Appendies. *Tick if applicable*

THERE ARE 13 PAGES OF QUESTIONS INCLUDING THIS PAGE

SECTION A (Total: 40 marks)

Answer ALL questions.

Please use the answer booklet provided.

1. Which of the following theories explain that plasma membrane is selectively permeable?
 - A. Complexed theory
 - B. Cascade theory
 - C. Fluid Mosaic theory
 - D. Unit membrane theory

2. Which type of cell junction provides mechanical strength by linking intermediate filaments between adjacent cells?
 - A. Gap Junctions
 - B. Tight Junctions
 - C. Hemidesmosomes
 - D. Desmosomes

3. Which of the following is true about passive transport?
 - A. It requires energy from the cell.
 - B. It does not require energy from the cell.
 - C. Substances move against their concentration gradient.
 - D. It only occurs in the mitochondria.

4. Which of the following is the primary structural protein in the extracellular matrix (ECM)?
- A. collagen
 - B. gelatin
 - C. phospholipids
 - D. protease
5. Which of the following is a function of stem cells in medical therapies?
- A. Carrying out all functions of a cell in the body.
 - B. Breaking down waste products in the cell.
 - C. Synthesizing proteins.
 - D. Repairing damaged tissues by differentiating into specialized cells.
6. Which of the following is a characteristic of microtubules?
- A. Involved in muscle contraction.
 - B. Has two distinct ends, called the plus (+) and minus (-) ends.
 - C. Made up of actin filaments.
 - D. Composed of keratin filaments.
7. The type of signaling in which a cell releases molecules that affect nearby cells is called _____
- A. endocrine
 - B. synaptic
 - C. paracrine
 - D. autocrine

8. The TCA cycle occurs in which part of the mitochondrion?
- A. Intermembrane space
 - B. Matrix
 - C. Inner membrane
 - D. Outer membrane
9. The scientists who invented the microscope is _____.
- A. Anton Leewenhoek
 - B. Robert Hooke
 - C. Schleiden
 - D. Schwann
10. The prokaryotic cells are characterized by _____.
- A. distinct chromosome
 - B. absence of nuclear membrane
 - C. absence of chromatin material
 - D. a distinct nuclear membrane
11. The process that involves the movement of water across a selectively permeable membrane is called _____.
- A. osmosis
 - B. filtration
 - C. active transport
 - D. diffusion

12. The oxygen and carbon dioxide crosses the plasma membrane by the process of _____.
- A. random diffusion
 - B. active diffusion
 - C. passive diffusion
 - D. facilitated diffusion
13. The main function of the Golgi apparatus is for _____.
- A. DNA replication
 - B. protein modification
 - C. protein degradation
 - D. DNA folding
14. The main function of mitosis in multicellular organisms is for _____.
- A. sexual reproduction
 - B. genetic variation
 - C. growth and repair
 - D. spore formation
15. The inner membrane of mitochondria is highly folded into structures known as _____.
- A. nucleosomes
 - B. ribosomes
 - C. cristae
 - D. centrosomes

16. The hydrophobic ends of phospholipid molecules are _____.
- A. polar
 - B. neutral
 - C. bipolar
 - D. non-polar
17. Peroxisomes detoxify harmful substances. Which of the following is a byproduct of this process?
- A. Carbon dioxide
 - B. Oxygen
 - C. Glucose
 - D. Hydrogen peroxide
18. Peroxisomes are involved in breaking down _____.
- A. proteins
 - B. fatty acids
 - C. nucleic acids
 - D. carbohydrates
19. Molecule that primarily responsible for structural integrity and tensile strength in the extracellular matrix (ECM) is _____.
- A. elastin
 - B. proteoglycans
 - C. collagen
 - D. fibronectin

20. Mitochondrial DNA is inherited through _____.
- A. both parents equally
 - B. random inheritance
 - C. maternal lineage
 - D. paternal lineage
21. Mitochondria are essential for _____.
- A. DNA replication
 - B. cell division
 - C. protein synthesis
 - D. energy production via cellular respiration
22. Hormones released into the bloodstream are involved in _____.
- A. synaptic signaling
 - B. endocrine signaling
 - C. autocrine signaling
 - D. paracrine signaling
23. Example of a molecule transported via primary active transport is _____.
- A. oxygen in lungs
 - B. sodium ions in neurons
 - C. glucose in the human intestine
 - D. sodium ions in neurons

24. During anaphase II of meiosis _____.
- A. homologous chromosomes separate
 - B. chromosomes aligned at the equator
 - C. sister chromatids separate
 - D. cytokinesis occurs
25. Choose one major difference between prokaryotic and eukaryotic cells.
- A. Eukaryotic cells do not contain DNA.
 - B. Prokaryotes have a membrane-bound nucleus, while eukaryotes do not.
 - C. Prokaryotes are multicellular, while eukaryotes are unicellular.
 - D. Eukaryotes have more complex organelles than prokaryotes.
26. Cadherins mediates _____.
- A. cell to cell adhesion
 - B. cell migration
 - C. ion exchange
 - D. DNA replication
27. Autocrine signaling occurs when a cell secretes molecules that act on _____.
- A. the extracellular matrix
 - B. itself
 - C. distant organs
 - D. nearby cells

28. All the following statement are true regarding the cell theory except _____.
- A. cell are the basic structural and functional unit of life
 - B. all cells arise from preexisting cells
 - C. all cell arise spontaneously
 - D. all living things or organism are made of cell
29. _____ limits animal cells from the outside.
- A. Basement membrane
 - B. Plasma membrane
 - C. Cell wall
 - D. Shell membrane
30. _____ is the basic unit of life.
- A. Cell
 - B. Organism
 - C. Atom
 - D. Molecule
31. "When biological membranes are frozen and then fractured, they tend to break along the plane of the bilayer."
The best explanation for this is that _____.
- A. the water present in the middle of the bilayer is frozen and can be easily fractured
 - B. the integral membrane proteins are not strong enough to hold the bilayer together
 - C. the carbon-carbon bonds of the phospholipid tails are easily broken
 - D. the hydrophobic interactions that hold the membrane together are weakest at this point
32. Non-functional Rb protein will caused _____.

33. Choose statements that correctly explains the process of mitochondrial mitophagy.
- A. They assist in protein synthesis.
 - B. They are transported to the nucleus.
 - C. They are degraded and removed by the cell.
 - D. They divide to create more mitochondria.
34. The fluidity of the plasma membrane increases with _____ in the membrane.
- A. increase in saturated fatty acids
 - B. increase in unsaturated fatty acids
 - C. increase in glycolipid content
 - D. increase in phospholipid content
35. _____ are tiny structures that carry out cell functions.
- A. Tissues
 - B. Fibronectin
 - C. Organelles
 - D. Ligand
36. Example of a molecule transported via primary active transport is _____.
- A. oxygen in lungs
 - B. sodium ions in neurons
 - C. sodium ions in neurons
 - D. glucose in the human intestine

37. Which of the following statements is the most important function for the glycoproteins and glycolipids of animal cell membranes?
- A. Maintaining membrane fluidity at low temperatures.
 - B. Maintaining the integrity of a fluid mosaic membrane.
 - C. Facilitated diffusion of molecules down their concentration gradients.
 - D. A cell's ability to distinguish one type of neighboring cell from another.
38. Choose the term used for the metabolic pathway in which glucose ($C_6O_{12}H_6$) is degraded to carbon dioxide (CO_2) and water.
- A. Oxidative phosphorylation
 - B. Cellular respiration
 - C. Citric acid cycle
 - D. Glycolysis
39. Choose the correct order of steps in binary fission.
- A. Septum formation → DNA duplication → Cell elongation → Z-ring formation
 - B. Z-ring formation → Cell elongation → DNA duplication → Septum formation
 - C. DNA duplication → Cell elongation → Z-ring formation → Septum formation
 - D. Cell elongation → Z-ring formation → DNA duplication → Septum formation
40. The movement of material through the membrane toward a region of lower concentration, via specific membrane proteins, is called _____.
- A. absorption
 - B. active transport
 - C. facilitated diffusion
 - D. diffusion

SECTION B (Total: 60 marks)

Answer **THREE (3)** questions only.

Please use the answer booklet provided.

Question 1

Answer the following questions:

- (a) Describe passive transport and the process of osmosis. (10 marks)

- (b) Distinguish the two types of active transport (primary and secondary active transport). (10 marks)

Question 2

Answer the following questions:

- (a) Explain the different mechanisms of cell-cell communication and highlight the significance of each type in maintaining tissue function. (10 marks)

- (b) Describe the role of the extracellular matrix (ECM) in cells, including its main components and their functions. (10 marks)

Question 3

Answer the following questions:

- (a) Describe the structural differences of the three types of cytoskeletal fibers (microtubules, microfilaments, and intermediate filaments).

(10 marks)

- (b) Explain the role of the cytoskeleton in maintaining cell integrity and function.

(10 marks)

Question 4

Answer the following questions:

- (a) Summarize the main event in cell cycle.

(10 marks)

- (b) Explain the molecular mechanisms of CDK and cyclin in regulating cell cycle.

(10 marks)

END OF EXAMINATION PAPER

