KATHMANDU UNIVERSITY
End Semester Examination
January, 2025
28-jan-025

Marks Scored:

Level : B.Pharm.
Year : I

Course : BIOL 102
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date :

SECTION "A"

[20 Q. × 1 = 20 marks]

Choose and encircle in the most appropriate option from each set of choices

1. Which one is photosynthetic prokaryotes?
   a. Spirogyra b. Chlorella c. Spirulina d. All of the above

2. All of the given bacteria are gram positive except:
   a. Staphylococcus aureus b. Bacillus anthracis
   c. Helicobacter pylori d. Staphylococcus pneumoniae

3. Exotoxins are
   a. Proteins b. Polysaccharide c. Steroids d. Lipids

4. Net ATP produced in glycolysis is:
   a. 1 b. 8 c. 4 d. 2

5. Which one is **WRONG** about motor protein:
   a. Kinesisn and Dyneins move along microtubules,
   b. Myosins move along microfilaments.
   c. Dyneins movement is from the (+) end of the microtubule to the (-) end
   d. Kinesin movement is from the (+) end of the microtubule to the (-) end

6. Which ions are present in higher concentrations outside the cell?
   a. Sodium & Potassium b. Chloride & Sodium
   c. Potassium & Chloride d. Sodium, Potassium & Chloride

7. Which one is **INCORRECT**:
   a. In tight junction, the cell membranes are connected, and the contents can move from one cell to another.
   b. Communicating junctions establish direct physical connections that link the cytoplasms of two cells together, permitting small molecules or ions to pass from one to the other.
   c. Gap junctions provide passageways large enough to permit small substances, such as simple sugars, water, ions and amino acids, to pass from the cytoplasm of one cell to that of the next, yet small enough to prevent the passage of larger molecules such as proteins.
   d. Hemidesmosomes anchor epithelial cells to a basement membrane (extracellular matrix).

8. **Axoneme** of cilia found in the airways and lungs have following arrangement of microtubule
   a. 9 + 0 b. 9 + 1 c. 9 + 2 d. 9 + 3

9. Which one is **WRONG** about Euchromatin and Heterochromatin?
   a. Heterochromatin is a highly condensed/tightly packed region of DNA.
   b. Heterochromatin is transcriptionally active.
   c. Euchromatin is a delicate, less condensed region of DNA.
   d. Euchromatin is transcriptionally active.

10. Which one is **TRUE** about membrane protein and phospholipid
    a. They are dynamic in nature
    b. Their lateral movement is restricted.
    c. They can move back and forth (flip-flop) easily.
    d. When two cells fuse, the proteins in their cell membrane will not mix over the cell surface.

11. Which type of intermediate filament is present in muscle?
    a. Keratin b. Desmin c. Lamin d. Vimentin

12. During the electron transport chain reaction in mitochondria, which one is **CORRECT**?
    a. Protons are pumped towards the matrix by complex I, III and IV.
    b. The source of energy for ATP synthesis is the electrochemical gradient of OH^- ion.
    c. Oxygen is generated in the last step of the ETC reaction.
    d. Protons are pumped toward the intermembrane space by complex I, III and IV.

13. Subunit of 70S ribosomes are:
    a. 30S and 50S b. 40S and 50S c. 20S and 50S d. 30S and 40S

14. Actin is the structural unit of
    a. Microfilament b. Cell membrane c. microtubule d. intermediate filament

15. Ribosome is not present in.
    a. Rough endoplasmic reticulum b. Chloroplast
    b. Mitochondria d. Vacuole

16. How many pairs of centrioles are there in the anaphase stage of mitosis?
    a. 6 b. 4 c. 2 d. 1

17. Write the **CORRECT** order for the Solenoid model of packaging of DNA
    a. DNA → nucleosome → solenoid → chromatin fiber → chromatid → chromosome
    b. DNA → solenoid → nucleosome → chromatin fiber → chromatid → chromosome
    c. DNA → nucleosome → solenoid → chromatid → chromatin fiber → chromosome
    d. DNA → nucleosome → chromatid → chromatin fiber → solenoid → chromosome

18. Humans have 700 times more DNA than E. coli. On this basis select the correct statement
    a. Humans have 700 times higher genes than E. coli
    b. Humans have 700 times higher protein than E. coli.
    c. Humans have 700 times higher RNA than E. coli.
    d. Human DNA content is 700 times more than that of E. coli

19. Haploid mitotic cells are found in all of them except:
    a. Fungi b. Plant gametophyte
    c. Male bees d. Human gametophyte

20. Which compound helps to maintain fluidity in the cell membrane?
    a. Flavonoid b. Terpenoid c. Glycerol d. Cholesterol

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F. M. : 55

Check (√) the number of each question you have answered in the front page of main answer book (of Sections B, C and D).

SECTION "B"

[5 Q. × 3 = 15 marks]

Attempt ANY FIVE questions.

1. What do you mean by adipose tissue? Write its two major functions. Write its types. [1+1+1]
2. Write about carotenoids and anthocyanins. [1.5+1.5]
3. Elaborate three points which illustrate that prokaryotes are very essential for us with example for each. [3]
4. Write short notes on fission and fusion of mitochondria. [3]
5. Explain nuclear lamina with its functions. [3]
6. On what condition Glucose is converted to lactate in our body? Define fermentation. Give the equation for glycolysis showing the quantity of reactant and products (ATP, NADH, water, hydrogen ion and Pyruvate). [0.5+0.5+2]
7. Define tight junction with a figure. Write two major functions of tight junctions. [1+2]

SECTION "C"

[5 Q. × 5 = 25 marks]

Attempt ANY FIVE questions.

8. Write the process of asexual reproduction of prokaryotes with diagram. Why gram-positive bacteria retain gram stain even after washing with alcohol? [3+2]
9. What is RNA translation? Describe the process of protein synthesis with diagrams. [1+4]
10. Mention the type of proteins present in the plasma membrane and explain them with suitable figures. [5]
11. Mention the four signaling pathway and explain the two signaling pathway with examples. [1+2+2]
12. Define Karyotype? Give four features of human karyotype. Write two major advantages or applications of karyotype in detail. [1+2+2]

P.T.O.

13. Write about the prometaphase stage of mitosis along with four steps for the formation of metaphase plate. [5]

14. Having more content of DNA does not mean that there is higher number of gene. Similarly, lesser DNA content doesn't mean lesser gene. Justify the statements. [5]

SECTION "D"

[2 Q. × 7.5 = 15 marks]

Attempt ANY TWO questions.

15. Membrane proteins and phospholipids are unable to move back and forth (flip-flop). Discuss it by giving a suitable experimental report provided by Larry Frye and Michael. Discuss the mechanism of cell lysis by using detergent with figures. Discuss the role of cholesterol in cell membrane. [2+4+1.5=7.5]

16. Write the four major chemical components of chromosomes. Describe the proteins found in chromosome. Illustrate giant chromosomes with example. Write two advantages of giant chromosomes. [1+3+1.5+2=7.5]

17. Write about the three passive diffusion process by which movement of substance occurs through the plasm membrane (Provide figure also). What do you mean by active transport of substance across the plasma membrane? Explain with a figure, how glucose is transported from the lumen of intestine into the intestinal epithelial cells. [3+1.5+3=7.5]