2022

MICROBIOLOGY — HONOURS

Paper : CC-4

(Cell Biology)

(Unit 1 to Unit 5)

Full Marks : 50

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer ***question no.*** **1** and ***any three*** questions from the rest.

1. Answer ***any ten*** questions : 2×10

(a) Name two diseases related to lamin gene defect.

(b) Mention the role of phosphatidylinositol in cell signaling.

(c) How can you identify the transmembrane regions of an integral membrane protein?

(d) State two major functions of Sphingomyelin.

(e) Why is the presence of carbohydrates important in cell membrane?

(f) "p53 plays important role in cell cycle regulation."— Explain the statement.

(g) What is the significance of Plasmodesmata?

(h) What is the difference between a mutagen and a carcinogen?

(i) What do you mean by pleuripotent stem cells?

(j) What is an adapter protein in cell signaling? Give example.

(k) Mention any one similarity and one dissimilarity between G-protein and Ras.

(l) What is the significance of protein glycosylation?

(m) State differences between prokaryotic and eukaryotic cells.

(n) Where do you find multipotent stem cells in plants?

(o) Mention the significance of spindle check point in cell cycle regulation.

2. (a) "S-CDK triggers DNA replication and ensures that DNA replication is initiated only once per cell cycle." — Explain.

(b) State the differences between apoptosis and necrosis. State briefly the role of Bcl-2 family of proteins in cell death control.

(c) How do you identify cancer cells physically? 3+(2+3)+2

3. Write short notes on the following : 2½×4

(a) Nuclear pore complex

(b) Nucleolus

(c) Plasma membrane

(d) Meiosis.

4. (a) Why erythrocytes have been useful in studying the plasma membrane? Describe the method of solubilisation of membrane proteins.

(b) Mention two applications of stem cells.

(c) Mention the main components of Gap junction. How can the permeability through gap junction be regulated? (2+2)+2+(1½+2½)

5. (a) What is CENP-A? How is it related to centromere?

(b) Illustrate the sequential condensation of DNA into chromatin fibre with representative diagram of each stage.

(c) Describe the functions of first and second messengers with suitable examples.

(d) Give one example of lipid-linked protein. (1+1)+3+(2+2)+1

6. (a) What will happen if the GTP bound to Gα subunit of trimeric G-protein is modified in such a manner, that it cannot be hydrolyzed? Will cAMP be produced in such a case?— Justify.

(b) What will be the fate of the secretory proteins if there is mutation in (i) COP II proteins (ii) clathrin proteins?

(c) Briefly explain the role of SNARE proteins in vesicular transport.

(d) State two unique features of archeal membrane. (2+1)+3+2+2

7. (a) Briefly describe the steps of assembly of intermediate filaments.

(b) Differentiate between actin bundles and actin network.

(c) What are the common chemical modifications of histones? State the significance of those modifications. 2+2+(3+3)