Printed Page:- 04 Subject Code:- BBT0304

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: III - THEORY EXAMINATION (2024 - 2025)

Subject: Biophysics and Bioinstrumentation

Time: 3 Hours Max. Marks: 100

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A 20

1. Attempt all parts:-

1-a. Most abundant lipid in plasma membrane is (CO1,K1) 1

(a) Cholesterol

(b) Sterol

(c) Glycolipid

(d) Phospholipids

1-b. Movement of substances across cell membrane is controlled by the (CO1,K1, K2) 1

(a) size of permeating particles

(b) permeability of membrane

(c) membrane proteins

(d) All of the above

1-c. _____is the difference in charge between the cell's internal environment (negatively charged) and the cell's exterior. (CO2,K1) 1

(a) membrane potential

(b) action potential

(c) hyperpolarization

(d) depolarization

1-d. Influx of sodium ions into the neuron will cause which of the following? (CO2,K1) 1

(a) Repolarization

(b) Hyperpolarization
(c) Polarization
(d) Depolarization

1-e. In which type of cell are ligand-gated ion channels most commonly found? (CO3,K1) 1

(a) Cells that need to respond quickly to external stimuli
(b) Cells that produce large proteins
(c) Cells that respond to mechanic forces
(d) Cells that are terminally differentiated

1-f. In_____in the vertebrate retina the phototransduction apparatus is in the outer segment, which contains a stack of discs, each formed by a closed sac of membrane in which photosensitive_____molecules are embedded. (CO3,K1, K3) 1

(a) rod photoreceptors, rhodopsin
(b) rhodopsin, rhodopsin
(c) rod photoreceptors, rod photoreceptors
(d) rhodopsin, rod photoreceptors

1-g. All amino acids are optically active except 1

(a) Glycine
(b) Serine
(c) Threonine
(d) Tryptophan

1-h. _____angle is formed between two intersecting planes in proteins. (CO4,K1) 1

(a) Dihedral/torsion
(b) obtuse angle
(c) right
(d) acute

1-i. What is the principle behind MRI imaging? (CO5,K1) 1

(a) X-ray diffraction
(b) Nuclear magnetic resonance
(c) Photon emission
(d) Electron scattering

1-j. PET imaging detects radiation emitted by: (CO5,K1,K2) 1

(a) Protons
(b) Neutrons
(c) Positrons
(d) Electrons

2. Attempt all parts:-

2.a.	What is dialysis? (CO1,K1)	2
2.b.	What are excitable cells? How they differ from other cells? (CO2,K1.K2)	2
2.c.	What is the other name of Na+/K+ pump? Discuss it in detail? (CO3,K1,K2)	2
2.d.	What are the two major sorts of connection between beta strands? (CO4,K1,K2)	2
2.e.	Write any two differences between dynein and kinesin? (CO5,K1)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Describe the structure and functions of aquaporins with suitable diagram? (CO1,K2)	6
3-b.	What is dialysis? Explain its role in blood purification? (CO1,K1,K2)	6
3-c.	What are the major differences between electrical and chemical synapse? (CO2,K1)	6
3-d.	What is reflex action? Explain the mechanism by giving example? (CO2,K1,K2)	6
3.e.	Discuss about the lock and key model of ligand-receptor interaction? (CO3,K2)	6
3.f.	Explain in detail the structural organization of proteins? (CO4,K1)	6
3.g.	Describe the mechanism of cell migration? (CO5,K2)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	A man drinks a concentrated salt solution and vomits after sometime. Why? (CO1,K1,K2)	10
4-b.	How do substances travel in the cell? What is the main role of the cell membrane in the transport mechanism? What determines whether a transport process is active or passive? (CO1,K2,K3)	10

5. Answer any one of the following:-

5-a.	What are the causes and consequences of conduction disorder? Discuss in detail (CO2,K1,K2)	10
5-b.	Whar are electrically excitable cells? What is the function of excitable cells?Why are muscle and nervous tissue considered excitable? (CO2,K1,K2)	10

6. Answer any one of the following:-

6-a.	Explain the role of G-proteins in signal amplification. (CO3,K1,K2)	10
6-b.	"Sodium potassium pump is an example of active transport". Discuss? Also classify about the different types of transport ATPases? (CO3,K1,K2)	10

7. Answer any one of the following:-

7-a.	What is circular dichroism? Discuss it in detail? Also write its advantages and disadvantages? (CO4,K1,K2)	10
7-b.	How do you describe proteins? Discuss the hierarchial structure of proteins in detail with suitable examples? (CO4,K1,K2)	10

8. Answer any <u>one</u> of the following:-

8-a.	Explain the principle of nuclear magnetic resonance and its application in MRI. (CO5,K1,K2)	10
8-b.	What is the principle of CT imaging, and how is it executed in medical diagnostics? Discuss the advantages and limitations of CT imaging compared to other techniques? (CO5,K1,K2)	10