



‘সমাজে মন্ত্র: সমিতি: সমাজী’

UNIVERSITY OF NORTH BENGAL

B.Sc. Major 3rd Semester Examination, 2025

ZOOLMAJ305-ZOOLOGY

CELL BIOLOGY

Time Allotted: 2 Hours 30 Minutes

Full Marks: 60

The figures in the margin indicate full marks.

1. Answer any **four** questions: 3×4 = 12
 - (a) Differentiate between CGN and TGN.
 - (b) State the location and function of $F_0 - F_1$ particles.
 - (c) Distinguish between euchromatin and heterochromatin.
 - (d) Differentiate passive and active transports across plasma membrane with suitable examples.
 - (e) What is chiasmata and when does it form?
 - (f) Why are lipids important component of plasmamembrane?

2. Answer any **four** questions: 6×4 = 24
 - (a) Classify lysosomes and mention their respective functions.
 - (b) Write brief notes on MTOC and MAP.
 - (c) Briefly describe the process of microfilament assembly and disassembly.
 - (d) Write a short note on the structure of the Centriole.
 - (e) “Mitochondria is semiautonomous” — Explain.
 - (f) Elucidate the role of MPF in the progression of Cell through cell cycle.

3. Answer any **two** questions: 12×2 = 24
 - (a) Describe the signaling events through a GPCR upon ligand binding with suitable diagrams. Why do protein ligands have their receptors on the cell surface? 10+2
 - (b) What do you mean G0-phase? How does a quiescent cell differ from that one in G0-stage? Briefly explain the role of cyclins and CDKs in mitotic cell division. State the importances of securin and separase in cell division. 2+2+6+2
 - (c) Describe the Complex I through Complex IV of Electron Transport system. Write a short note on the chemi-osmotic hypothesis. Name two enzymes present in the mitochondrial matrix. 7+4+1
 - (d) How endosomes are formed by endocytic pathway? Describe the mechanism for targeting the lysosomal protein from the Golgi apparatus to the endosomes. 6+6

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UNIVERSITY OF NORTH BENGAL

B.Sc. Major 3rd Semester Examination, 2025

ZOOMAJ306-ZOOLOGY

BIOCHEMISTRY: FUNDAMENTALS

Time Allotted: 2 Hours 30 Minutes

Full Marks: 60

The figures in the margin indicate full marks.

1. Answer any **four** questions from the following: 3×4 = 12
 - (a) Name one carbohydrate molecule having aldehyde alcohol and carboxylic groups and show these groups in its structure. 1+2
 - (b) Distinguish between reducing and non-reducing sugars along with examples.
 - (c) Give examples of lipids acting as signals, cofactor and pigments.
 - (d) Give two examples of amino acids with sulphydryl (–SH) groups along with their structure. 1 $\frac{1}{2}$ + 1 $\frac{1}{2}$
 - (e) What is meant by rancidification of fat?
 - (f) What is ribozyme? Give an example. 2+1

2. Answer any **four** questions from the following: 6×4 = 24
 - (a) Write short notes on sphingolipids and conjugated proteins. 3+3
 - (b) Describe the role of regulatory factors on enzyme activity.
 - (c) Describe the building blocks of deoxyribonucleic acid. How does it differ from that of the ribonucleic acid? 4+2
 - (d) Why is the peptide bond considered to be coplanar? What are phi (φ) and psi (Ψ) angles? Write about Ramachandran plot. 2+1+3
 - (e) Discuss on the different types of non-covalent bonds.
 - (f) When is the hemiacetal ring structure formed in an aldohexose sugar? Draw the pyranose and furanose form of glucose. 3+3

3. Answer any **two** questions from the following: 12×2 = 24
 - (a) Classify polysaccharides on the basis of structure and function with suitable examples. Define reducing and non-reducing disaccharides with suitable examples. Draw the structure of a pair of enantiomers, epimers and anomers of aldopentose. 3+3+6
 - (b) Name the classes and types of reactions catalyzed by enzymes. Define isoenzyme along with a suitable example. Name two enzymes associated with a dehydrogenase enzyme. 4+4+4
 - (c) Describe the different levels of organization in protein structure. What are the physiological significance of protein? 8+4
 - (d) Give the differences between oil and wax. Classify lipids along with suitable examples. Explain what is meant by saturated and unsaturated fatty acids. 2+8+2

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‘समानो मन्त्रः समितिः समानी’

UNIVERSITY OF NORTH BENGAL
B.Sc. Minor/Dsc 3rd Semester Examination, 2025

ZOOLMIN303/ZOOLDSC303-ZOOLOGY

CELL BIOLOGY

Time Allotted: 2 Hours 30 Minutes

Full Marks: 60

The figures in the margin indicate full marks.

1. Answer any **four** questions:

3×4 = 12

নিম্নলিখিত যে-কোন চারটি প্রশ্নের উত্তর দাও:

কোন চারটি প্রশ্নের উত্তর লেখুন —

(a) What is facilitated diffusion?

ফ্যাসিলিটেটেড ডিফিউশন কাকে বলে ?

সহজ পারিএকো প্রসারণ (facilitated diffusion) মনে কো কে হো ?

(b) What do you mean by Peroxisomes and Spherosomes?

Peroxisomes এবং Spherosomes বলতে কি বোঝ ?

পরঅক্সিসোম (Peroxisomes) র স্পেরোসোম (Spherosomes) মন্বালে কে বুদ্ধিন্ত ?

(c) State the major functions of Golgi Complex.

Golgi Complex-এর মুখ্য কাজগুলি কি ?

গোল্জী উপকরণকো মুখ্য ভূমিকা বারে উল্লেখ গন্বহোস্ ।

(d) Write the characteristic features of S-phase in a cell cycle.

কোষ চক্রের সংশ্লেষ দশার বৈশিষ্ট্যগুলি লেখ ।

কোষ চক্রকো S-phase কো বিশেষতা বারে লেখুনহোস্ ।

(e) What are the differences between SER and RER?

SER এবং RER-এর পার্থক্যগুলি লেখ ।

SER র RER বিচকো মিন্বতা বারে লেখুনহোস্ ।

(f) Write the characteristic features of anaphase chromosome.

এনাফেজ ক্রোমোজোমের বৈশিষ্ট্যগুলি লেখ ।

এনাফেজ ক্রোমোজোমকো বিশেষতাহর লেখুনহোস্ ।

2. Answer any **four** questions:

6×4 = 24

নিম্নলিখিত যে-কোন চারটি প্রশ্নের উত্তর দাও:

কোন চারটি প্রশ্নের উত্তর লেখুন —

(a) Describe the structure and function of Nucleus.

নিউক্লিয়াসের গঠন এবং কাজ সম্বন্ধে লেখ ।

নাভিক (Nucleus) কো সংরচনা র কার্যহরকো বর্ণন গন্বহোস্ ।

- (b) Explain Na^+/K^+ Pump as a good example of active transport system.
 सक्रिय परिवहन चक्र के Na^+/K^+ Pump उदाहरण হিসেবে लेख।
 सक्रिय यातायात प्रणालीको राम्रो उदाहरणको रूपमा Na^+/K^+ पम्पलाई वर्णन गर्नुहोस्।
- (c) Briefly describe the Fluid-Mosaic model of cell membrane with proper diagram.
 कोषपर्दार Fluid-Mosaic model-টি छिद्र सहकारे वर्णना कर।
 कोष झिल्लीको संरचना Fluid-Mosaic मोडलको आधारमा चित्र सहित वर्णन गर्नुहोस्।
- (d) How does G_1 -S checkpoint maintain the progression of cell cycle?
 कितावे G_1 -S checkpoint कोष चक्र कार्यकारी भूमिका नेय ?
 G_1 -S जाँच बिन्दुले कसरी कोषिका चक्रको प्रगतिको निगरानी गर्छ ?
- (e) Describe polymorphism in lysosome with suitable diagram.
 Lysosome-एर बहुरूपता छिद्रसह वर्णना कर।
 उपयुक्त चित्र सहित लाइसोसोमा बहुरूपता वर्णन गर्नुहोस्।
- (f) Explain the structure of centrosome. Mention its importance in cell division.
 Centrosome-एर गठन वर्णना कर। कोष विभाजने उहार कार्यकारितागुलि लेख।
 सेन्ट्रोसोमको संरचना व्याख्या गर्नुहोस्। कोष विभाजनमा सेन्ट्रोसोमको महत्त्व बारे उल्लेख गर्नुहोस्।

3. Answer any *two* questions:

12×2 = 24

निम्नलिखित ये-कान *दुई* प्रश्नर उत्तर दाओः

कुनै *दुईवटा* प्रश्नहरूको उत्तर लेख्नुहोस् :

- (a) Explain the structure and function of Mitochondria. 8+4
 Mitochondria-एर गठन एवं कार्यकारितागुलि लेख।
 माइटोकण्ड्रीयाको संरचना र भूमिकाको वर्णन गर्नुहोस्।
- (b) Explain the G-Protein mediated Cell Signalling Process. 12
 G-Protein द्वारा Cell Signalling कितावे सम्पन्न हय, तार वर्णना दाओ।
 G-Protein को माध्यमवाट हुने संकेत सर्वारहको प्रक्रिया वारेमा वर्णन गर्नुहोस्।
- (c) Briefly describe the characteristic features of the substages of Prophase-I of Meiotic Cell division along with proper diagram. What is interphase stage? 10+2
 छिद्र सहयोगे Prophase-I Meiotic कोष विभाजनेर उपसुत्तेर वैशिष्ट्यगुलि लेख। अन्तरवर्ती दशा कि ?
 उपयुक्त चित्रसहित प्रोफेजका उप-चरणहरूको विशेषताहरू संक्षेपमा व्याख्या गर्नुहोस्। Interphase चरण भनेको के हो ?
- (d) Describe the 'Nucleosome model' proposed by Kornberg and Thomas in 1974. 8+(2+2)
 What are linker DNA and core DNA?
 Kornberg एवं Thomas (1974)-एर Nucleosome Model वर्णना कर। Linker DNA एवं core DNA कि ?
 Kornberg र Thomas ले 1974 मा प्रस्ताव गरेको Nucleosome मोडल वर्णन गर्नुहोस्। लिङ्कर DNA र कोर DNA के के हुन् ?

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