MZO-004

ASSIGNMENT BOOKLET

M.Sc. (Zoology) Programme

(MSCZOO)

(SYSTEMATICS, BIODIVERSITY AND EVOLUTION)

Valid from 1st January, 2026 to 31st December, 2026

School of Sciences
Indira Gandhi National Open University
Maidan Garhi, New Delhi-110068

(2026)

Dear Student,

Please read the Section on assignments in the Programme Guide for M.Sc. (Zoology). A weightage of 30%, as you are aware, has been earmarked for continuous evaluation, which would consist of one tutor-marked assignment for this course. The assignment is in this booklet. The total marks for this assignment is 100, of which 40 marks are needed to pass it.

Instructions for formatting your Assignments

Before attempting the assignment please read the following instructions carefully:

1) On top of the first page of your answer sheet, please write the details exactly in the following format:

ROLL NO.: ……

NAME: ……..

ADDRESS: ……

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COURSE CODE: …….

COURSE TITLE: …….

ASSIGNMENT NO.: ……..…

STUDY CENTRE: ……..…....

DATE: ……..……...

PLEASE FOLLOW THE ABOVE FORMAT STRICTLY TO FACILITATE EVALUATION AND TO AVOID DELAY.

2) Use only foolscap size writing paper (but not of very thin variety) for writing your answers.

3) Leave 4 cm margin on the left, top and bottom of your answer sheet.

4) Your answers should be precise.

5) Solve this assignment, and **submit the complete assignment answer sheets within the due date.**

6) The assignment answer sheets are to be submitted to your Study Centre within the due date. **Answer sheets received after the due date shall not be accepted. We strongly suggest that you retain a copy of your answer sheets.**

7) **This assignment is valid from 1st January, 2026 to 31st December, 2026.** If you have failed in this assignment or fail to submit it till its validity, then you need to get the assignment for the next year and submit it as per the instructions given in the Programme Guide.

8) **You cannot fill the examination form for this course** until you have submitted this assignment.

We wish you good luck.

ASSIGNMENT
(Tutor Marked Assignment)

Course Code: MZO-004
Assignment Code: MZO-004/TMA/2026
Maximum Marks: 100

Note: Attempt all questions. The mark for each question is indicated against it.

1. (a) Explain how the principles of evolutionary biology account for antibiotic resistance in bacteria and highlight its broader applications in science and society. (5)

   (b) Describe how the Big Bang theory, formation of Earth, and the concept of chemical evolution together explain the origin of life on our planet. (5)

2. Explain the key features and representation of phylogenetic trees, including nodes, branches, root, terminal nodes, outgroup, scaled (phylogram) and unscaled (cladogram) trees, rooted and unrooted trees, polytomy, and monophyletic, paraphyletic, and polyphyletic groups. (10)

3. Describe the key features, variability, and biological significance of bacterial genomes, including operons, plasmids, *PHX* genes, and adaptations in *Deinococcus radiodurans*. (10)

4. Explain the role of plasmids in horizontal gene transfer in bacteria, including F, Hfr, and F' plasmids, and their significance in antibiotic resistance, virulence, and genetic recombination. (10)

5. (a) Explain the two models proposed for the origin of the endoplasmic reticulum (ER) in eukaryotes and discuss how ER evolution is linked to the development of protein secretion pathways and the Golgi apparatus. (5)

   (b) Describe how mitosis, meiosis, and sexual reproduction likely evolved in early eukaryotes, and explain how diploidy and meiosis provide survival and genetic diversity advantages. (5)

6. Explain the theory of endosymbiosis and describe how primary endosymbiosis led to the origin of mitochondria and chloroplasts, including gene transfer to the host nucleus and loss of independence of these organelles. (10)

7. (a) Explain the differences between Artificial, Natural, and Phylogenetic systems of classification, giving examples and their importance in studying relationships and evolution of organisms. (5)

   (b) Explain the components of taxonomy and describe the different types of taxonomy, including classical, modern, and molecular approaches, with suitable examples. (5)

8. (a) Discuss the role of cyanobacteria in transforming Earth's early environment and explain how this change influenced the evolution of complex life forms. (5)

   (b) Differentiate between catastrophic, mass, and background extinctions with suitable examples from Earth's history. (5)

9. Discuss the unique anatomical and genetic traits that distinguish modern humans from other hominins and great apes. (10)

10. Describe the following: (2½×4=10)

a) RNA World hypothesis

b) Molecular drive

c) Evolution of gene families

d) Sympatric speciation