BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: MSc/PRE-PHD **SEMESTER : Ist**
BRANCH: ENVIRONMENTAL SCIENCE AND TECHNOLOGY **SESSION : MO/2025**

SUBJECT: MET25501 ECOLOGY AND BIODIVERSITY

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Describe the different levels of biological organization in the environment, from individual organisms to the biosphere. Illustrate your answer with suitable examples.	[5]	01	02
Q.1(b)	Explain the Gaia Hypothesis. How does it describe the Earth as a self-regulating system?	[5]	01	03
Q.2(a)	Explain Liebig's Law of Minimum and Shelford's Law of Tolerance in the light of the concept of limiting factors in ecosystem.	[5]	02	03
Q.2(b)	An ecosystem has GPP = 2000 and autotroph respiration Ra = 1200 Kcal/m^2/yr. Herbivores consume 40% of NPP, their assimilation efficiency = 60% and respiration Rh = 100. Carnivores consume 50% of herbivore production, with assimilation efficiency = 80% and respiration Rc = 20. Find (a). NPP, (b) herbivore production (P_1), (c) Carnivore production (P_2).	[5]	02	03
Q.3(a)	Illustrate the hydrological cycle with a neat diagram and explain its role in regulating ecosystem functions.	[5]	03	02
Q.3(b)	A plant species is growing in soil contaminated with cadmium (Cd). • The concentration of Cd in soil is 2 mg/kg. • The concentration of Cd in the plant root is 10 mg/kg. • The concentration of Cd in the shoot is 5 mg/kg. (a) Calculate the Bioconcentration Factor (BCF). (b) Calculate the Translocation Factor (TF). (c) Interpret the results in terms of bioaccumulation and mobility of Cd in the plant.	[5]	03	03
Q.4(a)	Derive the logistic population growth equation and explain the role of carrying capacity (K) in regulating population size.	[5]	04	03
Q.4(b)	Define interspecific interactions and Explain the Lotka–Volterra model of interspecific competition.	[5]	04	02
Q.5(a)	Define Biodiversity and discuss the types and levels of biodiversity.	[5]	05	02
Q.5(b)	Write a note on Ex-situ biodiversity conservation measures with examples.	[5]	05	02

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