

Centre for Energy Studies

ESL-710 Energy, Ecology & Environment

Major Test

Time : 2 hrs.

PART – A : 20 Marks

1. Explain the following :

- i) Basal Metabolic rate and effect of body mass of organisms on metabolic rate.
- ii) 'Liebig's Law of minimum' giving examples.
- iii) Role of microorganisms in the different phases of Nitrogen cycle.
- iv) A 10th level carnivore is not found in nature.
- v) The ecological relationship of Bracken fern indicates that it is one of the most successful autotrophic plants in the ecosystem.
- vi) DO sag curve and the significance of critical point in surface water.
- vii) Most 5-day BOD tests are not affected by nitrification. (7x2=14)

2. a) Waste water with BOD₅ equal to ^{to} about 400 mg/L is treated in a treatment plant that removes 80% of BOD. You are to do a 5 day BOD test with a standard bottle using a mixture of the treated waste water and dilution water (without seeding). Assuming DO initial as 9.2 mg/L.

- i) What maximum volume of treated waste water should you put in the bottle if you want to have at least 2.5 mg/L of DO at the end of the test? (1.5)
- ii) If you make the mixture half water and half treated waste water, what DO would you expect after 5 days? (1.5)
- iii) The treatment plant discharges 1.0 m³/s of treated waste water into a stream that has 8.0, m³/S and a BOD of its own equal to 7.0 mg/L. Assuming complete and instantaneous mixing, find ultimate BOD (L_0) of the river just downstream from the discharge point. (1.5)

~~b)~~ Calculate N BOD if N content (in form of NH₃) in waste water is 5 mg/L. (1.5)