Centre for Energy Studies

ESL-710 Energy Ecology Environment

Time : 1 hr.   Minor Test - I   Marks : 20

1. Population projection is quite often mathematically modeled with a S-shaped growth curve as shown below :

   $$dN/dt = rN\,(1-N/K)$$

   Explain each term in the above equation and derive the expressions

   i) To show that there is a smooth transition in the growth curve from an exponential growth to a steady-state condition.

   ii) To obtain N, t* (time at which N is half the carrying capacity, r and maximum sustainable yield.   (7)

2. With the help of a neat diagram discuss the process of 'photosynthesis' clearly explaining the role of the following :

   i) Photosphere, ii) PAR, iii) Pigments, iv) Light reaction and v) Dark reaction   (6)

3. a) State Lindedman's Law of Trophic efficiencies. Write down its limitation and modified definition of Trophic efficiency   (3)

   b) The energy flow diagram is shown below :
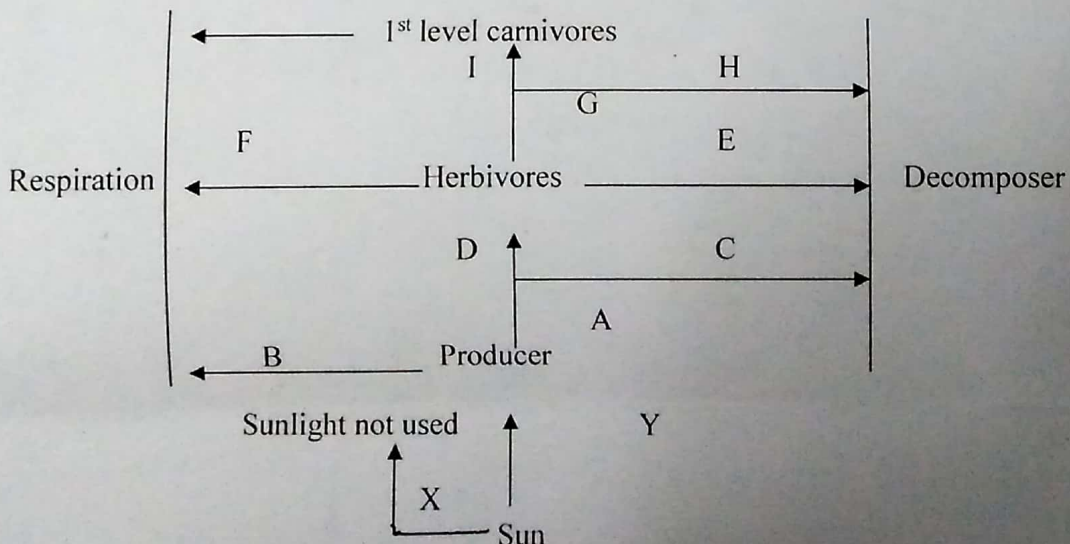
   Calculate

   i)   Exploitation, assimilation, production and tropic efficiencies of the herbivores.   (2)

   ii)   Justify the statement that the 'Pyramid of Numbers' can be inverted but a 'Pyramid of Energy' can never be inverted.   (2)