M.Sc. Examination, 2017
Semester – IV
Zoology
Paper – MZET – 401
(Population & Community Ecology)

Time: 4 Hours **Full Marks: 80**

Questions are of value as indicated in the margin.
Answer ***any eight*** questions

1. What do you mean by Transmission coefficient? Describe the infection model of pathogen population dynamics using a model how can you calculate the threshold value? 2+8 = 10

2. Why do we need 'diversity index' in community ecology? Describe with example the computational procedure and properties of Shannon-Wienner diversity index. What are the equivalent diversity indices for Hill's diversity, N_A where A = 0, 1 and 2. 1+(4+2)+3 = 10

3. What do you mean by discrete generation of population? In discrete generation of population, find out the values of N_1, N_2, P_1 and P_2 with a suitable mathematical model, where $N_0 = 50$ (prey population) and $P_0 = 0.2$ (Predator population), growth rate $R=1.5$, $N_{eq}=100$, $B=0.005$, $C=0.5$, and $S=2.0$ 2+8 = 10

4. What is 'Species abundance'? List different species abundance models. Prepare a table by splitting the supplied data into Preston's octaves. 1+4+5 = 10

X	1	2	3	4	5	6	7	9	10	11	21	28	33	120
f	32	8	9	2	3	3	3	2	1	2	1	1	1	1

5. What is Allee effect? Describe Allee effect with examples. Mathematically distinguish between strong and weak Allee effect. 2+4+4 = 10

6. What is metapopulation? Describe metapopulation model of local extinction and colonization and with this model prove that the population persist only when $e/m<1$, where m is the rate of patch colonization and e is the rate of patch extinction. 2+8 = 10

7. What are interactive essential and complementary resources? With graphical representation describe the interactions of these resources to affect population growth. 2+2+3+3 = 10

8. What is niche preemption? Suppose in a niche the amount of nutritent is 1.0 and during succession each species take the nutrient k fraction (50 % of the total nutrient) of the remaining nutrient what will be the intake of nutrient of *ith* species during its arrival? 2+8 = 10

9. What do you mean by density independent population regulation? Describe the modern synthesis of population regulation. 4+6 = 10

10. Write short notes of the following (***any two***): 5+5 = 10

    a) Red data book
    b) Prey refuge
    c) Wild life protection Act (1972)
    d) *r* and *k* selection

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