UNIVERSITY OF ESWATINI

MAIN EXAMINATION PAPER 2019/2020

TITLE OF PAPER: SYSTEMATICS

COURSE CODE: BIO 402

TIME ALLOWED: THREE HOURS

INSTRUCTIONS: 1.   ANSWER ANY (4) QUESTIONS

2.   ALL QUESTIONS ARE 25 MARKS EACH.

SPECIAL REQUIREMENTS: GRAPH PAPER OR ARITHMETIC PAPER WITH SQUARES

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Question 1

The following is evolutionary data about plants a-q.

i. X gave rise to a - g
    Y gave rise to h – q
ii. X (a root) originated 8 million years ago
    Y (a root) originated 9 million years ago
iii. Z evolved from Y, 7 million years ago
iv. N, o, p, and q evolved from Z, parallel to each other.

Divergence Data

Time (million years)	X (Root)	Y (Root)
7		Z gave rise to present n – q (parallel)
5	a – d from e – g (node 1)	
4		m from h – l (node 7)
3	g from e & f (node 2)	hi from j – l (node 8)
2	a,b from c,d (node 3)	
1	a from b (node 4) c from d (node 5) e from f (node 6)	h from l (node 9) j from k l (node 10)
0 (Present day)	0.5 years	k from l (node 11)

Present data suggest that most species are equidistance (diversity index) apart except :-

   f is further from g
   g is closer to h(convergence)
   l is closer to m
   m is far from n – q.

a) i) Draw the evolutionary tree(with species in alphabetical order)

(15 marks)

ii)   Label the following parts of the tree

-   root
-   node
-   branch
-   clade

b) Discuss the phylogenetic relationships of the individuals.   **(10 marks)**

Question 2

Discuss at least ten (10) taxonomic characters that can be used in plant classification.   **(25 marks)**

Question 3

Populations are dynamic. What brings about variation in a plant population?   **(25 marks)**

Question 4

Discuss macromolecular systematics as a tool in conditions of phenotypic plasticity.   **(25 marks)**

Question 5

a) What is numerical taxonomy and what are its problems?   **(10 marks)**

b) Explain the logical steps involved in numerical taxonomy   **(15 marks)**

Question 6

a) Define the following terms:
  i.   Taxonomy
  ii.   Classification
  iii. Systematics
  iv.   Phenetic characters
  v.   Phyletic characters
  vi.   Empirical classification
  vii. Patristic similarity
  viii. Homoplastic similarity
  ix.   Parallelism
  x.   cladogram   **(20 marks)**

b) What are the applications of systematics?   **(5 marks)**