

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
DEPARTMENT OF PLANT BIOLOGY
FIRST SEMESTER BTECH. EXAMINATION, 2017/2018 SESSION

COURSE CODE PLB 515
COURSE TITLE: CYTOGENETICS
COURSE UNIT: 3
TIME ALLOWED: 2 HOURS

INSTRUCTION: ANSWER ANY FOUR (4) QUESTIONS IN ALL

- 1 a. As an informed plant breeder, describe in details how you will improve a crop for resistance to downy mildew infection in heterogeneous population plants.
 - b. Which form of selection will you adopt, as part of the improvement programme?
 - c. Clearly highlight the considerations that inform your selection method in 'b' above.
 - d. Highlight the different forms of reproductive isolating mechanism

- 2 a. A European raspberry (*Rubus idaeus*) has 14 chromosomes and dewberry (*Rubus caesius*) is a tetraploid with 28 chromosomes. If hybrids between these two species are sterile F₁ individuals and some unreduced gametes of the F₁ are fertile on backcrosses. Determine the chromosome number and the level ploidy for each of the following:
 - (i) F₁ generation (ii) F₁ backcrossed to *R. idaeus* (iii) F₁ backcrossed to *R. caesius* (iv) After treating F₁ with Colchicines.
 - b. State the functions of pretreatment in cytological examination of chromosomes

- 3 a. Discuss the essential steps involve in the study of plant somatic chromosomes.
 - b. Explain succinctly, modern synthetic theory of evolution

- 4 a. With the aid of appropriate examples explain the mechanism involved in the evolution of new species from interspecific hybridization and polyploidy in a natural population.
 - b. Using appropriate diagrams explain the types of natural selection

- 5 a. Based on the position of the centromere, briefly describe the types of chromosomes
 - b. Write in details on the following crop selection methods:
 - (i) Mass selection (ii) Pure line selection
 - c. Succinctly write on the following:
 - (i) Monoploid (ii) Nullisomy (iii) Tetrasomy (iv) Karyotyping (v) Mitotic index

- 6 a. Explain the following modes of speciation; (i) Allopatric (ii) Sympatric (iii) Parapatric
 - b. With three (3) examples each, give a general classification of crops that could be propagated and improved using clonal selection.
 - c. Briefly outline the characteristic of clones