

SULIT



First Semester Examination
2021/2022 Academic Session

February/March 2022

**BBT 402- Plant Genetics
(Genetik Tumbuhan)**

Duration : 2 hours
(Masa : 2 jam)

Please check that this examination paper consists of **FOUR (4)** pages of printed material before you begin the examination.

*[Sila pastikan bahawa kertas peperiksaan ini mengandungi **EMPAT (4)** muka surat yang bercetak sebelum anda memulakan peperiksaan ini.]*

Instructions : Answer **FOUR (4)** questions from 5 questions.

Arahan : Jawab **EMPAT (4)** soalan daripada 5 soalan.]

In the event of any discrepancies, the English version shall be used.

[Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi Bahasa Inggeris hendaklah digunapakai].

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1. [a] Explain **THREE (3)** types of mutation that change the size of chromosome with respective diagram.
*[Terangkan **TIGA (3)** jenis mutasi yang mengubah saiz kromosom dengan gambar rajah.]*
[6 marks / 6 markah]
- [b] Define epistasis and distinguish **THREE (3)** occurrences in plants with appropriate examples.
*[Takrifkan epistasis dan kenal beza **TIGA(3)** kejadian dalam tumbuhan dengan contoh yang sesuai.]*
[19 marks / 19 markah]
2. [a] Explain the 'multiple factor hypothesis' and give a diagram detailing an observation at the cellular level with genotypic ratio involved based on a visible phenotype.
[Terangkan 'hipotesis pelbagai faktor' dan berikan gambar rajah memperincikan pemerhatian di peringkat sel dengan nisbah genotip yang terlibat berdasarkan fenotip.]
[7 marks / 7 markah]
- [b] Examine **ONE (1)** example of chromosome mutation in plant breeding with supporting diagram.
*[Teliti **SATU (1)** contoh mutasi kromosom dalam pembiakbakaan tumbuhan dengan bantuan gambar rajah.]*
[18 marks / 18 markah]
3. [a] Explain the structure of the *Ac* transposon in maize. Explain the structural and functional differences between *Ds* and *Ac* transposons.
*[Jelaskan struktur transposon *Ac* dalam jagung. Terangkan perbezaan struktur dan fungsi antara transposon *Ds* dan *Ac*.]*
[7 marks/ 7 markah]
- [b] Distinguish between observed and expected heterozygosity.
[Bezakan antara heterozigositi tercerap dan dijangka.]
[6 marks/ 6 markah]
- [c] Using examples, differentiate between continuous and discontinuous variations.
[Dengan menggunakan contoh, bezakan antara variasi berterusan dan tidak berterusan.]
[12 marks/ 12 markah]

4. [a] Explain genetic linkage and explain why it is usually necessary to start with pure-breeding lines when measuring genetic linkage.
[Jelaskan untaiian genetik dan jelaskan mengapa ia biasanya perlu bermula dengan warisan pembiakan tulen apabila mengukur untaiian genetik.]

(6 marks / 6 markah)

- [b] A researcher found 51 red flowers and 49 yellow flowers from a natural population. The red flowers carry a dominant allele, and the yellow flowers are homozygous for a recessive allele. If the population is in Hardy–Weinberg equilibrium, analyze the estimated frequency of the recessive allele in the population and the quantity of red flowers in the sample are likely to be homozygous for the dominant allele.
[Seorang penyelidik menemukan 51 bunga merah dan 49 bunga kuning dari populasi semula jadi. Bunga merah membawa alel dominan, dan bunga kuning homozigus untuk alel resesif. Sekiranya populasi berada dalam keseimbangan Hardy-Weinberg, analisa anggaran kekerapan alel resesif dalam populasi dan kuantiti bunga merah dalam sampel yang mungkin homozigus untuk alel dominan.]

[7 marks/ 7 markah]

- [c] Analyze how evolution can influence the allele frequencies of a population.
[Analisa bagaimana evolusi boleh mempengaruhi frekuensi alel populasi.]

[12 marks/ 12 markah]

5. [a] Explain the origin of aneuploidy gametes by chromosome non-disjunction with diagrams.
[Terangkan asal-usul gamet aneuploid melalui tak-disjungsi kromosom bersama gambar rajah.]

[9 marks/ 9 markah]

- [b] Two homozygous varieties of Y plant species were crossed to produce F₁ hybrids. The average variance of corolla length for all three populations was 21.26. The variance of the F₂ was 53.46. Solve the estimated heritability of corolla length in the F₂ population.

[Dua varietas homozigus spesies Y dikacuk untuk menghasilkan hibrid F₁. Varians purata panjang korola untuk ketiga-tiga populasi adalah 21.26. Varians dalam F₂ adalah 53.46. Selesaikan anggaran keterwarisan panjang korola dalam populasi F₂.]

[6 marks/ 6 markah]

- [c] Differentiate between inbreeding depression with outbreeding depression in plant by giving appropriate examples.

[Bezakan antara depresi pembiakbakaan-dalam dengan depresi pembiakbakaan-luar tumbuhan bersama contoh yang sesuai.]

[10 marks/ 10 markah]

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