FACULTY	AGRICULTURE AND NATURAL RESOURCES		
DEPARTMENT	ANIMAL PRODUCTION, AGRIBUSINESS & ECONOMICS		
SUBJECT	GENETICS		
SUBJECT CODE	AASC 3681		
DATE	JUNE 2023		
DURATION	3 HOURS	Marks	100

SECOND OPPORTUNITY EXAMINATION

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This question paper consists of three (3) pages, including this front page.

Instructions

This question paper consists of six (6) questions.
Attempt **any five (5)** of them.

UNIVERSITY OF NAMIBIA EXAMINATIONS

QUESTION 1 **[20]**

Distinguish the following terms as they are applied in genetics:

(a) Incomplete dominance and co-dominance (4)
(b) Transcription and translation (4)
(c) Introns and Exons (4)
(d) Polyploidy and Aneuploidy (4)
(e) Leading strand and lagging strand (4)

QUESTION 2 **[20]**

2.1 Classify mutational changes of the following sequence:

DNA: TTC → mRNA: AAG → Lys

a) DNA: TTT → mRNA: AAA → Lys
b) DNA: ATC → mRNA: UAG → STOP
c) DNA: TCC → mRNA: AGG → Arg
d) DNA: TGC → mRNA: ACG→ Thr (8)

e) Which ones have deleterious effects on the organisms? (3)

2.2 Briefly explain male sex-differentiation or determination in mammals. (9)

QUESTION 3 **[20]**

(a) Briefly describe the process of the lac operon induction. (10)

(b) Explain the mechanisms of the Polymerase Chain Reaction (PCR) (10)

QUESTION 4 **[20]**

Write brief notes on the following:

a) Mendel's laws (5)

b) Penetrance (5)

c) Pleiotropy (5)

d) Duplication (5)

QUESTION 5 **[20]**

a) Explain the two ways in which Down syndrome arises and the associated phenotypic effects. (9)

b) Distinguish between frameshift and missense mutations. (6)

c) Using an example explain epigenetics and how epigenetic effects arise. (5)

QUESTION 6 **[20]**

Gene interactions can sometimes lead to new phenotypes. A classic example is comb type in poultry, which involves interaction of two genes. Given the following information: R-P- = Walnut; rrP- = Peanut; R-pp = Rose; rrpp = Single; determine the genotypes of the two parents in the following cases:

a) A walnut crossed with a single produces offspring ¼ of which are walnut, ¼ rose, ¼ pea, and ¼ single. (5)

b) A rose crossed with a walnut produces offspring 3/8 of which are walnut, 3/8 rose, 1/8 pea, and 1/8 single. (5)

c) A rose crossed with a pea produces five walnut and six pea offspring. (5)

d) A walnut crossed with a walnut produces one rose, two walnut, and one single offspring. (5)

End of examination