



FIJI NATIONAL UNIVERSITY
College of Agriculture, Fisheries & Forestry
School of Agriculture & Forestry
Department of Crop Science
Bachelor of Science in Agriculture– Year 2
Final Examination
Semester 2 - 2019
GPB 622-Principles of Genetics

Writing Time: 3:00 hours
Reading Time: extra 10 minutes allowed at the beginning of the exam
Total Marks: 100

INSTRUCTIONS:

1. This paper consists of **FOUR** pages.
2. Please check to see that all your paper is complete.
3. Answer all questions in the Answer Booklet only.
4. No written or printed material and mobile phones are allowed in the examination hall.
5. Marks allocated for each section appears at the side of each question so allocate your time accordingly.
6. This paper is divided into Three Section

| | |
|---------------------------------------|-------------------|
| Section A: Objective questions | (20 Marks) |
| Section B: Short answer | (30 Marks) |
| Section C: Essay | (50 Marks) |

Section A OBJECTIVE QUESTIONS - (20 MARKS)**Section A 1: Fill in the blanks****(10 x 1 = 10 Marks)**

1. _____ are made up of DNA and Proteins.
2. The _____ is the basic physical unit of inheritance.
3. The inheritance pattern through organelles mitochondria & chloroplasts is _____.
4. A chromosome with secondary constriction is referred to as _____.
5. _____ is the largest biomolecule in the cell.
6. _____ enzyme joins the Okazaki fragments
7. The synthesis of RNA from DNA is called _____.
8. The primary structure of a protein is made up of the _____ sequence.
9. A sudden change in the structure of a gene is called _____.
10. _____ is the manipulation of living organisms and to serve human needs.

Section A 2: Choose the best answer**(10 x 1 = 10 Marks)**

11. The father of Plant tissue culture is _____.
 - a. P. Berg
 - b. G. Mendel
 - c. G. Haberlandt
 - d. K. Mullis
12. _____ are passed from parents to offspring.
 - a. Genes
 - b. Proteins
 - c. Chromosomes
 - d. Amino acids
13. _____ is when a single gene influence more than one characteristics.
 - a. Epistasis
 - b. Polygenic
 - c. Multiple alleles
 - d. Pleiotropy
14. Each chromosome is bounded by a membrane called _____.
 - a. Plasma Membrane
 - b. Matrix
 - c. Nuclear Membrane
 - d. Pellicle.
15. Adenine and Guanine are _____.
 - a. Both Pyrimidines
 - b. Both Purines
 - c. Purines & Pyrimidines
 - d. Nucleotides
16. DNA polymerases can only make DNA in _____ the direction.
 - a. 5' to 3'
 - b. 3' to replication bubble
 - c. 3' to 5'
 - d. 5' to replication bubble
17. _____ is the synthesis of protein from mRNA.
 - a. Translation
 - b. Mitosis
 - c. Transcription
 - d. Meiosis

18. _____ was the pioneer man who discovered chromosomes.
- | | |
|-------------------|--------------|
| a. K. Mullis | c. P. Berg |
| b. E. Strasburger | d. G. Mendel |
19. _____ in plants helps to increase seed and fruit size.
- | | |
|---------------|----------------------|
| a. Mutation | c. Polyploidy |
| b. Aberration | d. None of the above |
20. A _____ is a gene that has been transferred naturally or artificially.
- | | |
|---------------|-------------|
| a. Transgene | c. Polygene |
| b. Pseudogene | d. Allele |

Section B: SHORT ANSWER - (30 MARKS)**Section B 1: Attempt any FIVE questions****(5 x 2 = 10 Marks)****Compare and generate suitable answers for the following:**

21. Genotype, Phenotype, P & F generation
22. Epistasis, Environmental Genes & Multiple alleles
23. Euchromatin, Heterochromatin, Histones and Non Histones
24. mRNA, tRNA and rRNA
25. Bio-policy and Biosafety
26. Qualitative and Quantitative traits

Section B 2: Attempt any FOUR questions**(4 x 5 = 20 Marks)****Apply the knowledge and generate answers for the following with diagrams:**

27. Law of purity of gametes
28. Semiconservative mode of DNA replication
29. Write notes on Genetic Code
30. Process of recombinant DNA technology
31. A floriculturist crosses two hibiscus plants, one bearing yellow flowers with another bearing red flowers and finds that all offspring have orange flowers. Both parents are true to type and 100% genetically pure.
 - i. What is the genotype of the parents?
 - ii. What is the genotype of the offspring?
 - iii. What is the phenotypic outcome of crossing two F1 progeny?

Student I D No.:

Date.....

Section C: ESSAY - (50 MARKS)

Attempt any FOUR questions

(4 x 12.5 = 50 Marks)

Demonstrate and generate information on the following

32. The process of translation with suitable Diagrams.
33. Steps of DNA replication with suitable Diagrams.
34. Morphology of Chromosomes with suitable Diagrams.
35. Social issues of using biotechnology in agriculture. Its advantages and disadvantages.
36. In rock melon, seedless, sweet fruit are desired by consumers. Sweetness is dominant to bitterness while seedless melons are recessive to seeded melons. A farmer plants a field with pure breeding sweet seeded melons and bitter, seedless melons. Carry out a Punnett square test to determine:
 - i. The genotypic and phenotypic ratio of the F1 generation
 - ii. The genotypic and phenotypic ratio of the F2 generation if the second and 11th offspring are crossed
 - iii. The genotypic and phenotypic ratio if an offspring that is heterozygous for both characteristics is crossed with a pure-breeding, recessive parent.

THE END

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