Roll No…….. **Total No. of Printed Pages: [01]**

Total No. of Questions: [13]

B.Sc. (Hons.) Agriculture (Semester – 2nd)

FUNDAMENTALS OF GENETICS

Subject Code: BAGRS1256

Paper ID: 21130117

Time: 03 Hours **Maximum Marks: 75**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 9 questions of 5 marks each. The student has to attempt any 7 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(2 marks each)**

Q1. Attempt the following:

a. Which cell organelles show extranuclear inheritance?
b. Define crossing over.
c. What is interkinesis?
d. Differentiate between transitions and transversions?
e. Classify various classes of mutations?
f. During the process of recombinant DNA technology, which enzyme is known as molecular scissor and which is known as molecular glue?
g. At the time of DNA replication, which enzyme is responsible for breaking hydrogen bonds between two strands of DNA?
h. Adjacent nucleotides are joined by which bond in DNA double helix?
i. What are the key steps involved in gene expression?
j. Why mutations play an important role during the process of evolution?

Section – B **(5 marks each)**

Q2. (a) What are the different types of genetic recombination in bacteria? (3)
(b) Differentiate between qualitative and quantitative traits? (2)

Q3. (a) What is a nucleosome? Briefly describe its structure? (3)
(b) Are linked genes present on the same chromosome and why? (2)

Q4. (a) What is Down's syndrome? (1)
(b) Write a short note on lac operon. (4)

Q5. What are the various methods for the detection of mutations? Give details of Ame's test.

Q6. (a) Write a short note on B- chromosomes? (3)
(b) Central dogma of molecular biology. (2)

Q7. Compare and contrast repressible and inducible operons.

Q8. Write a short note on:

a) Sex linkage. (2.5)
b) Explain diagrammatically, the process of repression in trp operon. (2.5)

Q9. Define mitosis. Explain its different stages.

Q10. (a) During the process of replication, which enzyme is involved in "unzipping" of DNA molecules? (2)
(b) How do genes direct the synthesis of proteins? (3)

Section – C **(10 marks each)**

Q11. (a) Draw Watson-Crick model of DNA double-helix. (4)
(b) Explain the process of meiosis in detail. (6)

Q12. (a) Write a short note on homologous recombination. (5)
(b) How does protein synthesis occur in prokaryotes? (5)

Q13. (a) Justify, " Genes are affected by environment" (5)
(b) Define Polygenic inheritance. (2.5)
(c) Explain how the photolyase enzyme is involved in breaking cyclobutane ring during photo-reactivation process of DNA repair? (2.5)