PG Even Semester (CBCS) Exam., May—2019

LIFE SCIENCE AND BIOINFORMATICS

(4th Semester)

Course No. : LSBCC–402 (B/Z)

Full Marks : 70
Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

Botany Students will answer from LSBCC–402 (B) and Zoology Students will answer from LSBCC–402 (Z)

(For Botany Students)

Course No. : LSBCC–402 (B)

(MOLECULAR GENETICS AND PLANT BREEDING)

Answer **five** questions, taking **one** from each Unit

UNIT—I

1. *(a)* Differentiate between euchromatin and heterochromatin. 2

(b) Discuss different theories in connection with elucidating the fine structure of gene. 10

(c) What is pseudogene? 2

2. *(a)* Discuss different types of post-translational modifications in eukaryotes. 10

(b) Add a note on splicing in mRNA. 4

UNIT—II

3. *(a)* What do you mean by complementation test? Discuss Benzer's experiments with phage T4. 1+6=7

(b) Differentiate between *cis*- and *trans*-complementation test with one example. 7

4. *(a)* What do you mean by linkage map? How can linkage map be constructed? 2+7=9

(b) Add on note on DNA methylation. 5

UNIT—III

5. With the help of suitable model, explain various types of regulation of plant gene expression. 14

6. *(a)* What do you mean by RNA interferance? Discuss about various steps involved in RNAi technology. 2+7=9

(b) With the help of one example, explain the phenomenon of plastidial inheritance. 5

UNIT—IV

7. *(a)* With one suitable example, explain that allele frequency in Hardy-Weinberg population is always constant, $(p + q = 1)$. 7

(b) In corn, kernel colour is governed by a dominant allele for white color (W) and by recessive allele (w). A random sample of 100 kernels from a population that is in H-W equilibrium reveals that 9 kernels are yellow (ww) and 91 kernels are white.

(i) Calculate the frequencies of yellow and white alleles in this population. 3½

(ii) Calculate the percentage of this population that is heterozygous. 3½

8. *(a)* What are the different types of quantitative variation in a population? 6

(b) Differentiate between broad-sense heritability and narrow-sense heritability. Explain how h^2 (heritability) is calculated for both the types. 2+4=6

(c) What do you mean by additive variance? 2

UNIT—V

9. What do you mean by self-incompatibility? Explain genetics of gametophytic incompatibility (GI) and sporophytic incompatibility (SI) in flowering plants. 2+(6+6)=14

10. *(a)* What do you mean by heterosis? Write different theories associated with understanding mechanism of heterosis. 1+(3+3)=7

(b) Add a note on 'Centers of origin of plant'. 7

(For Zoology Students)

Course No. : LSBCC–402 (Z)

(ANIMAL PHYSIOLOGY)

1. Write a note on blood clotting factors with a special note on the mechanism of blood coagulation. 4+10=14

OR

2. Write notes on the following : 7+7=14

(a) Reaction of hemoglobin and oxygen

(b) Hemopoiesis

3. Write notes on the following : 7+7=14

(a) Pulmonary volume and capacities

(b) Gaseous exchange in the lungs

OR

4. Write in detail on neural and chemical regulation of respiration. 14

5. Describe tubular reabsorption and secretion with suitable diagrams. 14

OR

6. Write notes on the following : 7+7=14

(a) General structural organization of the kidney

(b) Water excretion

7. Write in detail on the structure and function of various types of glial cells with diagrams. 14

OR

8. Write notes on the following : 7+7=14

(a) Resting membrane potential

(b) Mechanism of muscle contraction

9. Write notes on the following : 7+7=14

(a) Free radicals

(b) Basic mechanism of action of toxic agents

OR

10. Describe the cellular response to toxic agents with special reference to antioxidant defence system. 14

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