**PG Even Semester (CBCS) Exam., May—2018**

LIFE SCIENCE AND BIOINFORMATICS

**( 4th Semester )**

Course No. : LSBCC–402

*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 )**

**1.** *(a)* What do you mean by histone protein? Write briefly about different classes of histone protein with specific functions. 2+4=6





*(b)* Briefly discuss about the series of events regarding elucidation of fine structure of gene. 5

*(c)* Add a note on overlapping gene with example. 3

**OR**

**2.** *(a)* Elaborate on the processes involved in the conversion of a primary transcript to mature mRNA. 7

*(b)* Using specific example, explain the functional significance of post-translational modifications. 7

**3.** *(a)* What is linkage map? How are they constructed? 2+5=7

*(b)* Two genes A and B are linked. The other homologous chromosome contains their *a* and *b* allele. Give combination of alleles in gametes with or without crossing-over. 3

*(c)* What is multiple allele? If father is of blood group A and mother of blood group AB, then what would be the percentage of children with blood group A? Justify your answer. 1+3=4

**OR**

**4.** *(a)* What do you mean by microsatellites and minisatellites? Add a note on different types of microsatellite markers in plants. Write the importance of SSR markers in plant genomic studies. 2+4+3=9

*(b)* With specific example, explain how DNA methylation can affect gene expression. 5

**5.** *(a)* With suitable model, explain auxin-regulated gene expression in plants. 7

*(b)* Explain molecular events in transcription of light-regulated genes. 7

**OR**

**6.** *(a)* Explain the following terminologies in connection with RNA interference : 3×3=9

*(i)* DICER

*(ii)* SiRNA

*(iii)* RISC

*(b)* With suitable sketches, explain plastid inheritance in *Mirabilis jalapa*. 5

**7.** *(a)* Differentiate between qualitative and quantitative traits. Write a note on different types of quantitative trait with examples. 2+3=5





*(b)* Write about the components of phenotypic variation ($V_p$). 5

*(c)* What do you mean by broad-sense heritability ($h^2B$) and narrow-sense heritability ($h^2N$)? 4

**OR**

**8.** *(a)* Explain Hardy-Weinberg law of genetic equilibrium with example. How is genetic equilibrium balanced in a population? 4+3=7

*(b)* The frequency of two alleles in gene pool is 0·19 (A) and 0·81 (a). Assume that the population is in Hardy-Weinberg equilibrium.

*(i)* Calculate the percentage of homozygous recessives in the population.

*(ii)* Calculate the percentage of heterozygous individuals in the population.

*(iii)* Calculate the percentage of homozygous dominants in the population. 7

**9.** *(a)* Differentiate between heterosis and inbreeding depression. 2

*(b)* Explain following terminologies : 2×3=6

*(i)* Average heterosis

*(ii)* Heterobeltosis

*(iii)* Negative heterosis

*(c)* Explain dominance and overdominance hypotheses of heterosis. 6

**OR**

**10.** *(a)* What do you mean by heteromorphic and homomorphic self- incompatibilities? Write a note on homomorphic self-incompatibility. 2+5=7

*(b)* With suitable model, explain the mechanism of self-incompatibility in plants. 7





( For Zoology Students )

Course No. : LSBCC–402 (Z)

**( ANIMAL PHYSIOLOGY )**

**1.** Describe the structure and function of hemoglobin with suitable diagrams. Write a note on sickle-cell anemia. 10+4=14

**OR**

**2.** Explain hemopoiesis with suitable diagrams. Write a detailed note on the cause and clinical aspect of thalassemia. 10+4=14

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

*(a)* Gaseous exchange

*(b)* Organization of respiratory system

**OR**

**4.** Write, in detail, on the regulation of respiration with reference to neural and chemical controls. 14

**5.** Write notes on the following : 7+7=14

*(a)* Structure of nephron

*(b)* Water excretion

**OR**

**6.** Write, in detail, on glomerular filtration. Describe the factors affecting the glomerular filtration rate. 10+4=14

**7.** Draw suitable diagrams and explain the structures and functions of various components of a neuron. 14

**OR**

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

*(a)* Action potential

*(b)* Ultrastructure of skeletal muscle fibre

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

*(a)* Free radicals-reactive oxygen and reactive nitrogen species

*(b)* Enzymatic and non-enzymatic antioxidant defense systems

**OR**

**10.** Write, in detail, on the basic mechanism of action of toxic agents and dose-response relationship. 14

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