PG Odd Semester (CBCS) Exam., December—2016

LIFE SCIENCE AND BIOINFORMATICS

(3rd Semester)

Course No. : LSBCC–304 (Z)

(Special Paper)

Full Marks : 70
Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

Candidates are to answer *either* Option—I *or* Option—II *or* Option—III *or* OPTION—IV

OPTION—I

(Molecular Genetics)

1. Differentiate between the following (any *two*) : 7×2=14

(a) Facultative and constitutive heterochromatin

(b) *Cis*-acting elements and *trans*-acting factors

(c) Regulatory elements and structural elements of a gene

OR

2. Write briefly about the regulation of gene expression in prokaryotic as well as eukaryotic organisms. 14

3. What is merozygote? What are the different methods of exchange of genetic materials in bacteria? Write a note on conjugation. 1+3+10=14

OR

4. How are lytic and lysogenic cascades regulated? 14

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

(a) Restriction endonuclease and their biological role

(b) cDNA library

OR

6. What do you mean by vector in genetic engineering? What are the different types and properties of a good vector? Write a note on any two major vectors giving example. 2+4+8=14

7. Give a descriptive note on the different stages of xenobiotic metabolism and the enzymes involved. 14

OR

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

(a) Pharmacogenetics

(b) Concept of metabolomics

9. Write a note on cell cycle and its regulation. 14

OR

10. What is apoptosis? How does it differ from nacrosis? What are the mechanisms of apoptosis? 14

OPTION—II

(Fishery Science and Aquaculture Biochemistry)

1. Define the terms ichthyology, pisciculture and fishery. Classify freshwater (FW) fishes of India up to families with examples mainly from North-East India. 2+12=14

OR

2. Write explanatory notes on any *two* of the following : 7×2=14

(a) Basic morphometrics and meristics in fish taxonomic works

(b) Zoogeography of FW fishes

(c) Any one of the fishery institutes in India along with their role in fisheries development

3. Define nutrition. What is the difference between egestion and excretion? Discuss the anatomical modifications of gut in relation to feeding habits and habitats in fishes. 2+12=14

OR

4. What is excretion? Describe critically the mechanism of excretion and osmoregulation in a typical FW fish. 2+12=14

5. Write explanatory notes on any *two* of the following : 7×2=14

(a) Length-weight relation (LWR) and Fulton's and LeCren's condition factors

(b) Fecundity in fishes

(c) Food and feeding habits in FW fishes

OR

6. What are common diseases found in FW fishes? Discuss any one of the following fish disease problems in India : 2+12=14

(a) Fungal diseases in fish

(b) Bacterial diseases in fish

(c) Viral diseases in fish

(d) Epizootic ulcerative fish disease syndrome (EVS)

7. Differentiate between capture fishery and culture fishery. Also, tabulate the important differences between a lotic and a lentic water body. Describe critically the fishery of any one lotic water body and any one lentic water body in India with special reference to North-East India. 1+1+6+6=14

OR

8. Write explanatory notes on any *two* of the following : 7×2=14

(a) Wetland (Beel) fishery in Assam

(b) Fishing contrivances and gears used by fisherfolk in North-East India with special reference to Assam

(c) Socio-economics of traditional fisherfolk

9. Define polyculture. Tabulate the differences between composite fish farming and integrated fish farming (IFF). Critically discuss either composite fish farming or IFF with special emphasis on North-East India. 1+2+11=14

OR

10. Write concise notes on the following : 7+7=14

(a) Raceway culture

(b) Bundh breeding

OPTION—III

(Molecular Neurobiology)

1. Describe the structure of a neuron. Write in detail on the functions of various components of a neuron. Draw suitable diagrams. 14

OR

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

(a) Anatomy and selectivity of the blood brain barrier

(b) Cerebrospinal fluid and hydrocephalous

3. Write in detail on the mechanism involved in release of neurotransmitters by synaptic vesicles. Describe how synaptic vesicles are recycled. Write a note on how proteins are involved in the vesicular release of neurotransmitter. 6+4+4=14

OR

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

(a) Synthesis of neuronal protein

(b) GABA and serotonin

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

(a) Action potential

(b) Resting membrane potential

OR

6. Describe the molecular and neurochemical basis of neuronal and glial cells generation and survival. Draw suitable diagrams. 14

7. *(a)* Explain implicit and explicit forms of memory. 4

(b) Draw suitable diagrams and explain explicit memory in mammals. 10

OR

8. What is behavior? Explain how mutations in single genes can affect certain behaviors. 2+12=14

9. Explain the molecular and neurochemical basis of myasthenia gravis. 14

OR

10. Describe the neurochemical basis of depression. 14

OPTION—IV

(Animal Biochemistry)

1. Describe the role of enthalpy, entropy and free energy in biological reactions. Explain the different forces that stabilize the biological macromolecules. 7+7=14

OR

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

(a) Lipids in biological membrane

(b) Functions of glycoproteins and lipoproteins

3. Describe the primary, secondary, tertiary and quaternary structures of protein. Explain chaperon-mediated protein folding. 7+7=14

OR

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

(a) Feedback and allosteric enzyme inhibition

(b) Mechanism and action of serine protease

5. Describe the three regulatory steps of glycolysis. Write an account on the fate of pyruvate with suitable diagram. 7+7=14

OR

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

(a) Glyoxylate cycle

(b) Lactic acid cycle

7. Describe the oxidative pentose phosphate pathway with a note on its regulation. 7+7=14

OR

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

(a) Oxidative phosphorylation

(b) Structure and function of NADPH and GTP

9. Explain how fatty acids are activated and transported into mitochondria. Describe the pathway of saturated fatty acid degradation. 14

OR

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

(a) Metabolic engineering and its applications

(b) Urea cycle

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