2018/ODD/09/26/LSB–304 (Z)
(A/B/C/D/E/F)/064

PG Odd Semester (CBCS) Exam., December—2018

LIFE SCIENCE AND BIOINFORMATICS

(3rd Semester)

Course No. : LSBCC–304 (Z)

Full Marks : 70
Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

Candidates have to answer *either* from Option—A *or* Option—B *or* Option—C *or* Option—D *or* Option—E *or* Option—F

OPTION—A

Course No. : LSBCC–304 (Z) (A)

(ANIMAL BIOCHEMISTRY)

1. Give an overview of animal biochemistry and significance of molecular interactions. Explain how the biological macromolecule stabilizes. 14

OR

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

(a) Glycolipids and glycoprotein

(b) Lipopolysaccharides

3. Explain enzyme classification. Give a descriptive note on various factors affecting enzyme activity. 14

OR

4. Write notes on the following : 7×2=14

(a) Protein structure

(b) Competitive and non-competitive inhibition

5. Describe TCA cycle with suitable diagram and its role in generating biosynthetic intermediate. 14

OR

6. Write notes on the following : 7×2=14

(a) Concept of metabolism

(b) Central role of ATP

7. Explain the process of ATP synthesis and chemiosmotic hypothesis of ATP generation. 14

OR

8. Write notes on the following : 7×2=14

(a) Electron transport chain

(b) Glycolysis

9. Explain fatty acid biosynthesis and degradation. Describe the significance of fatty acids in steroid metabolism. 14

OR

10. Write notes on the following : 7×2=14

(a) Glycogenesis

(b) Non-protein amino acids

OPTION—B

Course No. : LSBCC–304 (Z) (B)

(AQUATIC TOXICOLOGY)

1. Discuss the structure of water molecule. Briefly outline some common properties of water. What is biowater? 6+5+3=14

OR

2. Describe various biotic and abiotic components of an aquatic ecosystem. Briefly outline the global water cycle. 8+6=14

3. What is water pollution? Name some pollutants and their sources. Discuss on the arsenic and fluorine pollution of groundwater. 2+4+8=14

OR

4. Write short notes on the following : 7×2=14

(a) Bioaccumulation

(b) PAH

5. Discuss the cellular antioxidant defense mechanism. Briefly write about cytochrome P450 and their role in xenobiotic detoxification. 7+7=14

OR

6. What is dose-response relationship? Briefly elaborate on toxicity bioassays. What are the factors that influence toxicity in aquatic organisms? 4+4+6=14

7. Discuss the molecular mechanisms involved in arsenic transport in brake fern. 14

OR

8. Write short notes on the following : 7×2=14

(a) Bioreactor

(b) Constructed wetland

9. What is radioactivity? What are radioisotopes and how are they useful in detecting aquatic health? 2+12=14

OR

10. Discuss in brief the principle and applications of various chromatographic techniques. 14

OPTION—C

Course No. : LSBCC–304 (Z) (C)

(REPRODUCTIVE BIOLOGY AND ASSISTED TECHNOLOGY)

1. How is sex determined in mammals? Describe briefly the role of SRY and testosterone in sex determination. Use diagrams wherever necessary. 6+8=14

OR

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

(a) Reproductive endocrinology and hypothalamic ovarian control

(b) Stem cells as units of development and regeneration

3. What is fertilization? Describe briefly the process of fertilization and early development with the help of suitable diagrams. 2+12=14

OR

4. Write notes on the following : 7×2=14

(a) Growth hormone/IGF axis

(b) Placenta and its microbiome

5. Differentiate between the following : 7×2=14

(a) Pregnancy and Parturition

(b) Male and Female factor infertility

OR

6. What do you mean by semen analysis? Describe briefly the role of oxidative stress and DNA damage in male infertility. 8+6=14

7. What is meant by donation of gametes and embryos? How does it differ from surrogacy? Describe briefly their ethical, legal and social aspects. 4+4+6=14

OR

8. Write notes on the following : 7×2=14

(a) IUI

(b) Embryo culture and transfer

9. What are pharmacogenomics and personalized medicine? Describe briefly the role of pharmacogenomics in the development of new drugs. 4+10=14

OR

10. Write notes on the following : 7×2=14

(a) Maternal health

(b) Complementary medicine in infertility

OPTION—D

Course No. : LSBCC–304 (Z) (D)

(MOLECULAR GENETICS)

1. What are the differences between hetero-chromatin and euchromatin? Write a note on facultative heterochromatin with reference to dosage compensation. 3+11=14

OR

2. Write short notes on the following : 7×2=14

(a) Antisense RNA

(b) Attenuation

3. What is merozygote? Discuss the process of transduction in bacteria. 2+12=14

OR

4. Write short notes on the following : 7×2=14

(a) Pheromone-mediated conjugation

(b) Lac operon

5. Write a note on characteristic features of a good cloning vector. With reference to types of vectors, describe pBR322. 4+10=14

OR

6. Write short notes on the following : 7×2=14

(a) RT-PCR

(b) cDNA library

7. What do you mean by Phase-1 and Phase-2 metabolisms? Discuss the mechanisms. 14

OR

8. Write short notes on the following : 7×2=14

(a) Concept of metabolomics

(b) Cytochrome P450s

9. Describe the mechanism of regulation of cell cycles. 14

OR

10. Write short notes on the following : 7×2=14

(a) Mechanism of activation of oncogenes

(b) Tumor suppressor genes

OPTION—E

Course No. : LSBCC–304 (Z) (E)

(FISHERY SCIENCE AND AQUACULTURE)

1. Distinguish among ichthyology, fishery and pisciculture. Write a brief classification (up to family) of freshwater (FW) fishes of North-East (N-E) India with examples. 3+11=14

OR

2. Write concisely on the aspects given below : 7×2=14

(a) Past history of Indian ichthyology

(b) Contributions of Indian ichthyologists in the field of fishery science and aquaculture

3. Define nutrition. Differentiate between absorption and assimilation of food. Critically discuss the alimentary canal and mechanism of digestion in a typical teleost. 1½+1½+7+4=14

OR

4. Define excretion and osmoregulation. Differentiate between excretion and egestion. Briefly and critically discuss the excretory system and mechanism of excretion and osmoregulation in a typical teleost. 1+1+6+6=14

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

(a) Length-weight (L-W) relationship and condition factor in fishes

(b) Fecundity in fishes

(c) Extensive culture, intensive culture and pen culture in fishes

(d) Culture of plankton as fish food organism

OR

6. Discuss the fish diversity of *either (a)* in any one lentic body *or (b)* in any one lotic water body in India with special emphasis on North-East India and Assam. Add a brief para on the hill stream fishes of North-East India. 10+4=14

7. Define induced breeding in fishes. What are the different types of 'bundhs'? Define them. Discuss induced breeding practice in fishes by hypophysation technique. Add a note on their significance. 2+2+7+3=14

OR

8. Distinguish between composite fish farming and integrated fish farming. Discuss *either (a)* composite fish farming *or (b)* integrated fish farming with examples. 2+12=14

9. Write explanatory notes on the following : 7×2=14

(a) Diseases in freshwater fishes : bacterial, fungal, viral (any one)

(b) Androgenesis, gynogenesis, transgenic fishes

OR

10. Define epizootic ulcerative syndrome (EUS) in fishes. Write explanatory notes on EUS citing works of different workers globally. 2+12=14

OPTION—F

Course No. : LSBCC–304 (Z) (F)

(MOLECULAR NEUROBIOLOGY)

1. Describe the structure of a neuron. Explain the function of various parts of a neuron. Draw suitable diagrams. 14

OR

2. Write notes on the following : 5+5+4=14

(a) Anatomy and selectivity of the blood-brain barrier

(b) Cerebrospinal fluid and brain edema

(c) Metabolic blood-brain barrier

3. Describe the mechanism of neurotransmitter release by calcium influx. Write in detail on how the neurotransmitter is stored and released by synaptic vesicles. Write a note on proteins involved in the vesicular release of neurotransmitter. 4+7+3=14

OR

4. Write notes on the following : 8+6=14

(a) Acetylcholine and glutamate

(b) Transportation of neuronal proteins along the axon

5. Write notes on the following : 7×2=14

(a) Action potential

(b) Developmental processes that guide the axons from their origins to their targets

OR

6. Describe the molecular and neurochemical mechanisms by which cells acquire neuronal and glial cell identities. Write a note on how neurotrophic factors deprivation triggers apoptotic cell death in neurons. 9+5=14

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

(b) Describe the molecular mechanisms involved in explicit memory in mammals in the hippocampus. Draw diagrams. 4+10=14

OR

8. What is behaviour? Write in detail on how mutations in single genes can affect behaviour in various organisms. 2+12=14

9. Describe the cellular and molecular abnormalities in the brain that occur in Alzheimer's disease. Write a note on genetic risk factors identified for onset of Alzheimer's disease. 10+4=14

OR

10. Describe the cellular and neurochemical basis of depression involving serotonergic and noradrenergic pathways. 14

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