

2015

ZOOLOGY

( Major )

Paper : 5.1

( **Animal Physiology** )

Full Marks : 60

Time : 3 hours

*The figures in the margin indicate full marks  
for the questions*

1. Answer/Choose the correct answer  
any seven from the following :  $1 \times 7 = 7$
- (a) What is pacemaker?
  - (b) Define all or none response phenomenon of nerve fibre.
  - (c) Mention the name of the blood clotting factor which is known as anti-haemophilic factor.
  - (d) State the contents of gallbladder in man.
  - (e) Define heartbeat.

( Turn Over )

- (f) Which statement is correct?
- All arteries carry oxygenated blood
  - All veins carry oxygenated blood
  - All arteries except pulmonary artery carry oxygenated blood
  - All veins except pulmonary vein carry oxygenated blood
- (g) The plasma of a person in group 'O' contains antibody
- $\alpha$
  - $\beta$
  - $\alpha$  and  $\beta$
  - Neither  $\alpha$  nor  $\beta$
- (h) The oxyntic glands secrete
- pepsin
  - mucus
  - water
  - acid
- (i) Kwashiorkor is caused by deficiency of
- carbohydrates
  - proteins
  - fats
  - vitamins

- (j) The human heart is
- neurogenic
  - pulsating
  - myogenic
  - None of the above

2. Answer any four questions from the following : 2×4=8

- Differentiate between resting potential and action potential.
- Differentiate between pulmonary circulation and systemic circulation.
- Differentiate between isometric contraction and isotonic contraction.
- Differentiate between skeletal muscle and cardiac muscle.
- Differentiate between uricotelic excretion and ureotelic excretion.
- Differentiate between blood and lymph.
- Differentiate between essential and non-essential amino acids.
- Compare between the neuro-neuronal synapse and neuro-muscular synapse.

( 4 )

3. Answer any three questions from the following :  $5 \times 3 = 15$

(a) How does homoiostotic animal regulate osmotic concentration? 5

(b) Discuss about the renin-angiotensin-aldosterone system in vertebrate. 5

(c) Briefly describe the structure and functions of liver.  $3+2=5$

(d) Describe how interchange of gases occurs during external respiration. 5

(e) Define erythropoiesis. Where does it occur? What measures need to be taken before blood transfusion?  $1\frac{1}{2}+1\frac{1}{2}+2=5$

(f) State the name of the fat-soluble vitamins. Discuss the clinical effects of the deficiencies of each of these vitamins.  $1+4=5$

4. Give a detailed account of the cellular contents of blood. Briefly describe the functions of platelet.  $8+2=10$

Or

Describe the functional architecture of skeletal muscle with diagram. Discuss the sliding filament theory of muscle contraction.

$5+5=10$

( 5 )

5. What is metabolic water? Discuss in detail about the role of kidney in regulating water balance. Mention the role of ADH in water regulation process.  $1\frac{1}{2}+6+2\frac{1}{2}=10$

Or

Mention the role of 'chloride-secreting cells' in the gills of marine teleost. Give a brief account of osmoregulation in terrestrial animals.  $2+8=10$

6. Give a brief idea of nerve fibres. How does acetylcholine remove from the synaptic cleft after nerve impulse is over? Briefly describe the saltatory propagation of nerve impulse.  $3+2+5=10$

Or

Draw a well-labelled diagram of uriniferous tubule. State its different parts. How does filtration of blood occur in the nephron?

$2\frac{1}{2}+1\frac{1}{2}+6=10$

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ZOOLOGY

( Major )

Paper : 5.2

Full Marks : 60

Time : 3 hours

*The figures in the margin indicate full marks  
for the questions*

1. Answer the following as directed (any seven) : 1×7=7

- (a) What is reducing sugar?
- (b) Give the example of sulphur containing amino acids.
- (c) What is turnover number?
- (d) Define peptide bond.
- (e) What is proton motive force?
- (f) The quantitative study of transfer of energy and its interconversion in a biological system is known as \_\_\_\_\_.

( Fill in the blank )

( 2 )

(g) Stored fat is usually transported from one part of the body to another in the form of \_\_\_\_\_.

( Fill in the blank )

(h) Nucleoproteins are complex proteins formed by combination of \_\_\_\_\_.

( Fill in the blank )

(i) What do you mean by protein sparing function of carbohydrate?

2. Write very short answers (any four) :  $2 \times 4 = 8$

(a) Explain activation energy and energy barrier.

(b) Write about haemoglobin buffer system.

(c) What are fats and oils?

(d) Explain zymase and zymogen.

(e) Write the differences between 70S ribosome and 80S ribosome.

(f) "Enzymes are biological catalyst." Justify the statement.

(g) Explain the normal solutions of acids and bases.

( 3 )

3. Answer in short (any three) :  $5 \times 3 = 15$

(a) Describe mitochondrial electron transport system.

(b) Explain the fluid mosaic model of plasma membrane.

(c) Describe the structure of ATP molecule.

(d) Write a note on the biological significance of pH.

(e) Describe how chromatin gets assembled.

(f) Write about the important biological functions of protein.

Answer the following (any three) :  $10 \times 3 = 30$

4. Describe in brief the laws of thermodynamics. How are these laws applicable in animal life?  $5+5$

5. Define enzyme. Describe different classes of enzyme giving examples for each class.  $2+8$

6. What do you mean by oxidative phosphorylation? Describe the chemiosmotic hypothesis of oxidative phosphorylation.  $3+7$

( Turn Over )

7. Describe the ornithine cycle of urea formation and add a note on its significance. 5+5
8. Describe the mechanism of  $\beta$ -oxidation of fatty acid and write about its energetics in brief. 6+4

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Paper : 5.3

Full Marks : 60

Time : 3 hours

*The figures in the margin indicate full marks for the questions*

1. Choose the correct answer of the following :

1×7=7

(a) Thyroid hormone synthesis involves the iodination of

(i) tyrosine

(ii) alanine

(iii) tryptophan

(iv) methionine

(b) The hormone which acts through a nuclear receptor is

(i) growth hormone

(ii) insulin

(iii) oxytocin

(iv) thyroid hormone

( Turn Over )

- (c) A deficiency of parathyroid hormone can lead to
- (i) lowering of inorganic phosphate and elevation of calcium in blood
  - (ii) lowering of calcium and elevation of inorganic phosphate in blood
  - (iii) lowering of both inorganic phosphate and calcium in blood
  - (iv) elevation of both calcium and inorganic phosphate in blood
- (d) In the adrenal gland, glucocorticoids are secreted by the
- (i) zona glomerulosa
  - (ii) zona fasciculata
  - (iii) zona reticularis
  - (iv) medulla
- (e) The binding of an antigen by its antibody involves
- (i) hydrogen bonds
  - (ii) electrostatic forces
  - (iii) van der Waals forces
  - (iv) All of the above

- (f) The antibody which can exist as a dimer is
- (i) IgA
  - (ii) IgG
  - (iii) IgE
  - (iv) IgM
- (g) Peyer's patches are secondary lymphoid organs found
- (i) in the nasal epithelium
  - (ii) within the wall of the small intestine
  - (iii) in the lining of the stomach
  - (iv) in the lung

2. Answer briefly :

2×4=8

- (a) What is immunogen?
- (b) Identify the underlying hormonal abnormalities in diabetes mellitus and diabetes insipidus.
- (c) What is calcitonin?
- (d) What is adjuvant?



( 4 )

3. Write short notes on any *three* of the following :  $5 \times 3 = 15$

(a) Endocrine function of the posterior pituitary

(b) Biosynthesis of thyronine

(c) Autoimmunity

(d) Pathogen-associated molecular patterns

(e) MWC molecules

4. Describe the histology and endocrine function of the mammalian testis.  $5 + 5 = 10$

Or

Describe the histology and function of the endocrine pancreas.  $4 + 6 = 10$

5. Discuss the mechanism of action of protein hormones. 10

Or

Describe the structure of an antibody molecule and write briefly about the function of the different antibody classes.  $4 + 6 = 10$

( 5 )

6. Distinguish between primary and secondary immunodeficiencies. Write a brief note on the acquired immunodeficiency syndrome.  $4 + 6 = 10$

Or

Discuss the role of B and T lymphocytes in the generation of a humoral immune response. 10

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ZOOLOGY

( Major )

Paper : 5.4

Full Marks : 60

Time : 3 hours

*The figures in the margin indicate full marks for the questions*

1. Answer the following questions in brief :  $1 \times 6 = 6$

- (a) Which instrument measures colour of a sample?
- (b) What is the principle of cryopreservation?
- (c) What is radiotracer?
- (d) What is the measure of central tendency?
- (e) What is the application of fluorescence microscope?
- (f) Write the principle of geometric mean.

( Turn Over )

2. Answer any *five* of the following questions :

2×5=10

(a) What is the basic difference between colorimeter and spectrophotometer?

(b) Distinguish between paper chromatography and thin-layer chromatography.

(c) Distinguish between median and mode.

(d) Describe the basic principle of ultracentrifugation.

(e) Describe the significance of regression.

(f) Write the application of ANOVA in biological science.

3. Answer any *three* of the following questions :

5×3=15

(a) Describe the uses of spectrophotometer in zoology.

(b) Define harmonic mean with suitable example.

(c) Describe 'less than ogive' with suitable example.

(d) The following are the 6 groups of planktons collected from three sampling stations of river Brahmaputra. Represent the data using bar diagram :

Planktons	Site-1	Site-2	Site-3
Bacillariophyceae	55	64	69
Chlorophyceae	105	98	78
Cyanophyceae	59	61	62
Copepoda	53	52	61
Rotifers	43	38	32
Cladocera	23	25	27

4. Calculate median from the following data : 4

x	0-10	10-20	20-30	30-40	40-50	50-60	60-70
f	6	14	16	27	22	15	18

Or

What do you mean by sampling units? Describe the merits and demerits of random sampling techniques. 1+3=4

5. Describe the principle and application of thin-layer chromatography. 2+3=5

Or

Write the procedure and application of agarose gel electrophoresis. 5

6. What is independent sample *t*-test? Describe when to use the independent sample *t*-test. Discuss independent sample *t*-test with suitable example. 2+2+6=10

*Or*

Describe the principle and procedure of autoradiography for study or to understand cellular function. Describe its various applications. 3+3+4=10

7. Describe the principle of electron microscopy. Write the procedure and application of Transmission Electron Microscopy (TEM). 2+4+4=10

*Or*

Discuss the principle and procedure of cryopreservation techniques for preservation of egg and sperm. 5+5=10

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