

**M.Sc.,I- SEMESTER
HARD CORE PAPER- 4
ANIMAL PHYSIOLOGY**

THEORY

32 Hrs

UNIT I: Transport across the membrane, Cellular Respiration & Bioenergetics

8 Hrs

- A) Molecular mechanisms of passive and active transport.
- B) a) Energy – Concept, laws of thermodynamics
- b) Redox potential
- c) Stepwise release of energy through cytochromes, production of ATP, uncoupling of oxidative phosphorylation, inhibitors
- d) Anaerobic and aerobic breakdown of glucose, alternate pathway – HMP shunt and glucuronic acid pathway.
- e) Citric acid cycle as common metabolic pathway.

UNIT II: Circulation and Excretion

8 Hrs

- A) a) Major types of body fluids and their composition.
- b) Neurogenic and myogenic hearts.
- c) Mammalian heart – cardiac cycle, ECG.
- B) a) Nitrogenous waste products in animals
- b) Formation of ammonia, urea and uric acid.
- c) Nitrogen excretion in relation to water economy.
- d) Overview of urine formation in mammals with emphasis on regulation of fluid volume, blood pressure, sodium levels and Acid-base balance.

UNIT III: Muscle and Neurophysiology

8 Hrs

- A) a) Molecular organization of sarcomere.
- b) Mechanism of contraction with emphasis on sliding filament and Davies models, regeneration of storage phosphate.
- c) Physiological adaptations of muscles for jumping, swimming and flight.
- B) a) Electrochemical gradients – Nernst and Goldman equations.
- b) Axonal and synaptic transmission of nerve impulses.
- c) Synaptic integrity, synaptic plasticity.
- d) Molecular mechanism of sensory transduction and neural out put in receptor cells.

UNIT IV: Environmental Physiology

8 Hrs

- A) a) Concept of homeostasis, Regulators and conformers.
- b) Tolerance, resistance acclimation and acclimatization.
- c) Overview of thermal homeostasis in homeotherms, CNS regulation of body temperature maintenance.
- d) Temperature compensation in poikilotherms
- B) a) Overview of osmoregulation in aquatic and terrestrial animals.
- b) Stress: Metabolic and immunological responses.

PRACTICALS*

4x16 = 64 Hrs

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| 1. Estimation of blood glucose content. | 1x4 |
| 2. Estimation of glycogen in liver (collected from slaughter house) | 2x4 |
| 3. Determination of Blood cholesterol content. | 1x4 |
| 4. Determination of Iodine number of fats to evaluate the biological value. | 1x4 |
| 5. Total count of RBC and WBC's | 2x4 |
| 6. Differential count of WBC. | 1x4 |
| 7. Determination of serum phosphatases activity. | 2x4 |
| 8. Estimation of blood urea content. | 2x4 |
| 9. Determination of acetylcholine esterase activity. | 2x4 |
| 10. Response of RBC to different saline concentrations. | 1x4 |
| 11. Estimation of serum LDH activity | 1x4 |

* All estimations with Clinical Samples

REFERENCE

1. Guyton, A.G. (2002). Text Book of Medical Physiology, 12th Edn. Saunders Publication.
2. Hoar, W.S. (1983). General and Comparative Animal Physiology, 3rd Edn. Prentice Hall Inc.
3. Jayaraman, J. (1981). Laboratory Manual in Biochemistry, Wiley Eastern Ltd.
4. Murray, R.K., Garner, D.K., Mayes P.A. and Rodwell, V.W. (2003). Harper's Illustrated Biochemistry, 26th Edn. Lange Medical Books, McGraw Hill, New York.
5. Randal, D., Burggren, W. and French, K. (2002). Eckert Animal Physiology, Mechanisms and adaptations. 4th Edn. W. H. Freeman and Company, New York.
6. Plummer, D.T. (1988). An Introduction to Practical Biochemistry. Tata McGraw Hill Publishing Company, Ltd. New Delhi.
7. Schmid-Nielson, K. 2002. Animal Physiology: Adaptations and Environment, 5th Edn. Cambridge University Press, UK.