

## SEMESTER III. ZY3CMT03.

### COMPLEMENTARY COURSE -3

## PHYSIOLOGY AND IMMUNOLOGY

54 hrs  
Credits 3

### Objectives

- 1 To appreciate the correlation between structure and function of organisms
- 2 To make the student aware of the health related problems, their origin and treatment.
- 3 To understand how efficiently our immune system work in our body.
- 4 To acquire knowledge about preventing common diseases rather than curing.

### Module I

14 Hrs

**Nutrition:** Types of nutrition – autotrophy, heterotrophy. Nutritional requirements – carbohydrates, proteins, lipids, minerals (Ca, Fe, I), vitamins (sources and deficiency disorders), nutritional disorders

**Respiration:** Transport of respiratory gases in blood - transport of oxygen, transport of carbon dioxide, chloride shift. Respiratory disturbances – Hypoxia, Hypercapnia, Asphyxia, physiological effect of smoking, carbon monoxide poisoning.

**Circulation:** Composition and functions of blood. Plasma and formed elements - WBC, RBC and platelets, Mechanism of blood coagulation – clotting factors, intrinsic and extrinsic pathways, anticoagulants. ECG, Blood pressure, Arteriosclerosis, Hemophilia, cerebral and pulmonary thrombosis.

### Module II

14 hrs

**Excretion:** Structure of a nephron. Urine formation – glomerular filtration, tubular reabsorption, tubular secretion. Urine concentration – counter current mechanism. Composition of urine – normal and abnormal constituents. Hormonal regulation of kidney function. Kidney stone, dialysis.

**Neuro physiology:** Structure of a neuron. Myelinated and non myelinated nerve fibre, nerve impulse production (resting membrane potential, action potential), Impulse propagation, All or none law, saltatory conduction, synaptic transmission. Neurotransmitters (acetyl choline, adrenalin, dopamine), brain waves, EEG. Neural disorders - Parkinson's disease, Alzheimer's disease.

**Muscle physiology:** Types of muscles: striated, non striated and cardiac. Ultra structure of striated muscle, Mechanism of muscle contraction, cori cycle and muscle relaxation. Muscle fatigue, oxygen debt, Rigor mortis.

### Module III

8 hrs

**Endocrinology:** Introduction to Endocrine system. Mechanism of hormone action, Endocrine glands - hypothalamus, pituitary gland, pineal gland, thyroid gland, parathyroid gland, endocrine pancreas, adrenal gland, thymus gland, testis and ovary. Physiological role of hormones, Hormonal disorders.

### Module IV

12 Hrs

**Immunology:** Introduction to immunology, types of immunity – innate, acquired, passive, active, mechanism of innate immunity (barriers, inflammation, phagocytosis). Types of antigens. Basic structure of immunoglobulins, Classes of immunoglobulins and functions. Antigen antibody reactions, Precipitation test, agglutination test, WIDAL, VDRL, HIV test (ELISA),

### Module V

6 Hrs

**Immune response system:** (Brief accounts of the followings)

Primary and secondary lymphoid organs, Cells of Immune system - T&B lymphocytes, natural killer cells, macrophages, plasma cells, memory cells, Monoclonal antibodies, Hybridoma technology.

**Immune disorders:** Hypersensitivity, Auto immunity (rheumatoid arthritis) & Immunodeficiency (AIDS), Vaccines - BCG, DPT, Polio vaccine.

### REFERENCES

- Barret K.E et.al.,2009. Ganong's Review of Medical Physiology 23<sup>rd</sup> edn. by Mc Graw Hill, New Delhi.
- Best, C H, Taylor, N B 1991 Physiological basis of Medical practice 12th edn. edited by John B. West.
- Chakrabarti B K, Ghosh H N & Sahana S N 1984: Human Physiology, the New Book Stall, Calcutta, India
- Chatterjee C.C 1973: Human Physiology, Vol I 8<sup>th</sup> edn. Medical Allied Agency, Calcutta
- Chatterjee C.C 1975: Human Physiology Vol II 9<sup>th</sup> edn New Central Book Agency Calcutta.
- Hall J.E and C Guyton 2010 Text Book of Medical Physiology. 12<sup>th</sup> edn. Publishers Saunders
- Knut Schmidt Nilesen 2007 Animal Physiology – Adaptation and environment. Cambridge University press 5<sup>th</sup> ed.
- Prosser C L, Brown J R, Frank A 1962 : Comparative Animal Physiology 2<sup>nd</sup> edn. Saunders
- Roger Eckert; D Randall; George Augustine 1988: Animal Physiology, Mechanism and Adaptations, W.H Freeman, New York
- Singh H D, Madhavankutty K, Sarada Subrahmanyam 2014: Textbook of Human Physiology, 5<sup>th</sup> edn. S. Chand & Co Ltd, New Delhi.
- Zoological Society of Kerala, Study material 2002. *Biochemistry, Physiology and Developmental Biology* Published by Zoological Society of Kerala

**SEMESTER III**

**COMPLEMENTARY COURSE - 3 PRACTICAL  
PHYSIOLOGY AND IMMUNOLOGY**

**36Hrs**

**Credit 1**

1. Preparation of Human Blood smear & identification of leucocytes
2. Qualitative analysis of Reducing Sugar, Protein and Lipid
3. Action of Salivary amylase on Starch (Demonstration Only)
4. Estimation of Haemoglobin (Demonstration only)
5. Identification of human blood groups, A, AB, B and O, Rh factor
6. Instruments (Principle & uses)- Sphygmomanometer , Stethoscope