19BM101 FUNDAMENTALS OF ANATOMY AND PHYSIOLOGY

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Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P
45	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
10	30	-	10	-	-

COURSE DESCRIPTION AND OBJECTIVES:

This course provides a comprehensive study of the anatomy and physiology of the human body. Topics include in this course are body organization; respiratory, skeletal, circular, urinary,nervous systems and special senses systems. To know basic structural and functional elements of human body. To learn about organs and structures involving in system formation and functions.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes.

COs	Course Outcomes	POs
1	Attain knowledge on various tissues and organ systems necessary for biomedical engineers.	1
2	Analyze physiology of muscles, heart, lung, reproductive and nervous systems.	2
3	Apply the physiological laws in grasping concepts of capillary and gas exchanges in cardiovascular systems.	1
4	Record physiological signals by using spirometer, neurostim etc.	5
5	Conduct tests for constituents in blood to realize blood test procedures.	5,7,12

SKILLS:

- ✓ *Location of body parts and identification.*
- ✓ *Know the various tissues and their appearances.*
- ✓ *Know the physics behind respiratory systems.*
- ✓ *Circulatory system's working principle.*

UNIT - I **L-9**

BASIC ELEMENTS OF HUMAN BODY: Cell, structure and organelles, Functions of each component in the cell; Cell membrane, Transport across membrane, Origin of cell membrane potential, Action potential, Tissue - types, specialized tissues, functions.

UNIT - II **L-9**

MUSCULO-SKELETALSYSTEM: Skeletal system, Anatomy of bone, Bone types and functions; Joint types of joints – sinovial joints, types of movements cartilage and functions; Muscular system - types of muscles and their locations, Structure of skeletal muscle, physiology of muscle contraction, NMJ, types of muscles in limbs, locations and their actions.

UNIT - III **L-9**

CIRCULATORY SYSTEM: Blood composition, Functions of blood and components blood groups, Importance of blood groups, Identification of blood groups; **Structure of heart** – Properties of cardiac muscle, conducting system of heart, cardiac cycle, ECG, heart sound, volume and pressure changes and regulation of heart rate, circulatory system; Factors regulating blood flow; **Respiratory System-** Components of respiratory system, Respiratory mechanism, Types of respiration, Oxygen and carbon dioxide transport and acid base regulation, Respiratory volumes.

UNIT - IV **L-9**

URINARY AND REPRODUCTIVE SYSTEM: Urinary system - Structure of kidney and nephron; Mechanism of urine formation and acid base regulation, Urinary reflex, Homeostasis and blood pressure regulation by urinary system; Reproductive system - parts of male reproductive system (internal), spermatogenesis and hormonal regulation; Parts of female reproductive system (internal), Oogenesis and hormonal regulation, Menstrual cycle.

UNIT - V **L-9**

NERVOUS SYSTEM: Structure of a neuron, Types of neuron, Synapses and types, Conduction of action potential in neuron; Central nervous system – Anatomy of brain, spinal cord, regions of brain, brain waves, neurotransmitters, P.N.S - spinal reflex, reflex action, ANS - sympathetic and Para sympathetic systems, Special senses - Visual, auditory, gustation, smell.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS **TOTAL HOURS: 30**

1. Observe Histology-Slides of primary tissues of body.
2. Record the B.P. and effects of physical exertion and posture on this parameter.
3. Recording of mechanical response of the muscle on application of induced electric signal.
4. Determine the rate of conduction of nerve impulse.
5. Spirometry-Record tidal volume, Inspiratory reserve volume, Expiratory reserve volume, Vital capacity and index and effect of posture on vital capacity.
6. Determination of blood groups.
7. Determination of the hemoglobin content /percentage of blood.

8. Determination of WBC count of blood.
9. Determination of RBC count of blood.
10. Determination of bleeding and clotting time.
11. Study of human skeleton.
12. Study of human muscles, (upper limb).
13. Study of human muscles (lower limb).

TEXT BOOK:

1. Elaine.N.Marieb, "Essential of Human Anatomy and Physiology", 10th edition, Pearson Education, 2011.
2. Gerard J.Tortora, Bryan D. "Principles of Anatomy and Physiology",14thedition, John Wiley & Sons INC, 2014

REFERENCE BOOKS:

1. Gillian Pocock, Christopher D. Richards, "The human Body – An introduction for Biomedical and Health Sciences", Oxford University Press, USA, 2009.
2. William F.Ganong, "Review of Medical Physiology", 22nd edition, Mc Graw Hill, 2005.
3. Eldra Pearl Solomon, "Introduction to Human Anatomy and Physiology", W.B. Saunders Company, Harcourt Brace Jovanovich, 2003.
4. Guyton & Hall, "Medical Physiology", 12th edition, Elsevier Saunders, 2010.