**Physiological Anthropology: BANE 141**
**Tutor Marked Assignment**
**(TMA)**

**Course Code: BANE 141**
**Assignment Code: BANE 141/ASST/TMA/July 2026-January 2027**
**Total Marks: 100**

**There are three Sections in the Assignment. All questions are compulsory.**

## Assignment –I

**Answer any two of the following questions in about 500 words each. 20x2**

a) Discuss Energy systems.
b) What do you understand by the impact of long-term exercise on physiological characteristics based on age? Discuss
c) Briefly explain factors affecting lung functions.

## Assignment –II

**Answer any two questions in about 250 words each. 10x2**

a. Write short notes on any two of the following
i. Respiratory system in Exercise
ii. Importance of training
iii. Blood flow in the heart

**Answer any two of the following questions in about 150 words each. 5x2**

i. Physiological response to maximal exercise.
ii. Glycolysis
iii. Atheletic training and muscular plasticity

## Assignment –III

**Answer the following questions in the about 250 words 10x3=30**

i. Discuss in brief static lung respiratory function.
ii. What are the steps to measure pulse and heart rate.
iii. Explain the procedure for haemoglobin estimation.

## a) Discuss Energy systems.

### Answer

The body requires a continuous supply of energy for muscular contraction, nerve activity, circulation, breathing and maintenance of body temperature. Food contains chemical energy, but muscle fibres cannot use most food molecules directly for contraction. They use adenosine triphosphate (ATP), which releases usable energy when it is broken down to adenosine diphosphate (ADP) and inorganic phosphate. Since the ATP stored in muscle is very small, it must be regenerated throughout physical activity. Three overlapping energy systems do this: the phosphagen system, anaerobic glycolysis and the aerobic oxidative system. The relative contribution of each depends mainly on exercise intensity, duration and the person's fitness.

### ATP-PC or phosphagen system

The phosphagen system supplies energy almost immediately. A small store of ATP powers the first contractions, while phosphocreatine (PCr) rapidly donates a phosphate group to ADP through the enzyme creatine kinase. This resynthesises ATP without requiring oxygen and without producing lactate directly. It has a very high rate of energy delivery but limited capacity. Therefore, it is especially important during a jump, a heavy lift, an explosive start or a brief sprint lasting only a few seconds. As phosphocreatine falls, the contribution of the other systems rises. During rest or recovery, oxidative metabolism helps replenish phosphocreatine; recovery is not instantaneous.

### Anaerobic glycolytic system

Glycolysis breaks glucose obtained from blood or stored muscle glycogen into pyruvate through a sequence of enzyme-controlled reactions in the cytoplasm. It produces ATP more quickly than aerobic metabolism, but not as rapidly as the phosphagen system. Net ATP gain is two molecules per blood-glucose molecule, or three when starting from a muscle-glycogen unit, before any oxidative use of pyruvate. At very high exercise intensity, pyruvate is reduced to lactate so that NAD+ can be regenerated and glycolysis can continue. Lactate formation is not simply a waste-producing process: lactate can be used as fuel by the heart and other muscles and can be recycled by the liver. The burning feeling and fatigue during intense efforts are related to several metabolic and neural factors, not to lactate alone. This system contributes strongly to repeated fast efforts and events lasting roughly tens of seconds to a few minutes.