

**UNIVERSITY OF BOLTON**  
**SCHOOL OF ENGINEERING**  
**BIOMEDICAL ENGINEERING PATHWAY**  
**SEMESTER TWO EXAMINATIONS 2018/2019**  
**ANATOMY AND PHYSIOLOGY**  
**MODULE NO. BME4005**

Date: Monday 20<sup>th</sup> May 2019

Time: 10:00 – 12:00

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**Instructions to Candidates:**

There are **TWO** sections on this paper containing a total of 70 marks.

**Section A** - Answer **ALL** questions (35 marks).

**Section B** - Answer **ALL** questions (35 marks).

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**Section A – Answer ALL Questions**

1. The cell plasma membrane has all of the following roles/characteristics EXCEPT
  - a. Lines the body's cavities and organs
  - b. Separates intracellular and extracellular fluid
  - c. Regulates passage of substances into/out of cell
  - d. Has a phospholipid bilayer
  
2. The body is predominantly made up of which 4 chemical elements?
  - a. Carbon, Hydrogen, Iron, Oxygen
  - b. Hydrogen, Carbon Dioxide, Nitrogen, Water
  - c. Oxygen, Nitrogen, Carbon, Hydrogen
  - d. Nitrogen, Iron, Water, Oxygen
  
3. 60% of the body is made up a fluid environment. This comprises of
  - a. Water; blood
  - b. Plasma; interstitial fluid; water
  - c. Plasma; extracellular fluid; water
  - d. Interstitial fluid; plasma; intracellular fluid
  
4. During simple diffusion, the rate of substance exchange
  - a. Is faster with smaller particles
  - b. Is faster with a smaller surface area
  - c. Is slower over a shorter distance
  - d. Is slower over a steep concentration gradient
  
5. Primary active transport has all of the following characteristics EXCEPT
  - a. Is energy (ATP) consuming
  - b. Moves substances against their concentration gradient
  - c. Uses carrier proteins to move substances along their concentration gradient
  - d. Maintains the electrochemical gradient of the cell
  
6. An action potential is
  - a. A chemical message
  - b. A reversal of membrane polarity produced by a stimulus
  - c. The hyperpolarisation of a cell
  - d. Secondary active transport

**Section A continues over the page....**

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**Section A continued....**

7. Which of the following is also referred to as a voluntary muscle?
  - a. skeletal muscle
  - b. cardiac muscle
  - c. visceral muscle
  - d. smooth muscle
  
8. In the human body, Phagocytosis is illustrated by
  - a. Air being expelled from the lungs
  - b. A specific volume of blood expelled from the left ventricle
  - c. Vacuolar digestion of a solvent
  - d. White blood cells engulfing bacteria
  
9. The 4 primary tissue types found in the human body are
  - a. Squamous, cuboidal, columnar, glandular
  - b. Adipose, elastic, smooth, cardiac
  - c. Skeletal, cardiac, smooth, muscle
  - d. Epithelial, connective, muscle, neural
  
10. The two types of LAYERING recognised in epithelial tissues are
  - a. Cuboidal and Columnar
  - b. Squamous and Cuboidal
  - c. Columnar and Stratified
  - d. Simple and Stratified
  
11. Which of the following is classified as a long bone?
  - a. Vertebra
  - b. Calcaneous
  - c. Humerus
  - d. Scapula
  
12. Tendons attach:
  - a. Skeletal muscles to bones
  - b. The end of one bone to another bone
  - c. The trabecular framework to the periosteum
  - d. Articulations with the trabeculae

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**Section A continued....**

13. Ligaments attach:

- a. Skeletal muscles to bones
- b. The end of one bone to another bone
- c. The trabecular framework to the periosteum
- d. Articulations with the trabeculae

14. Which is not a function of the skeletal system?

- a. Mineral homeostasis
- b. Protects internal organs
- c. To produce movements
- d. Blood cell production

15. Cancellous bone:

- a. Is formed in osteons
- b. Forms the external layer of all bones
- c. Is made of trabeculae
- d. Is strongest when stressed axially

16. During bone homeostasis, controlled mechanical stresses cause

- a. Deposition of bone matrix
- b. Osteoporosis
- c. More bone resorption than deposition
- d. Greater risk of fractures

17. The 3 types of muscle tissue are

- a. Epimysium, perimysium, endomysium
- b. Skeletal, smooth, cardiac
- c. Elastic, collagen, fibrous
- d. Voluntary, involuntary, resting

18. Smooth muscle has all of the following characteristics EXCEPT

- a. Stronger contractions than skeletal muscle
- b. Stimulated by the autonomic nervous system
- c. Spontaneous, involuntary contractions
- d. More sustained contractions than skeletal muscle

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**Section A continued....**

19. The surrounding layer of an individual muscle fibre is called
- Sarcolemma
  - Perimysium
  - Epimysium
  - Sarcoplasmic reticulum
20. The smallest functional unit of the muscle fibre is
- Thick filament
  - Thin filament
  - Z line
  - Sarcomere
21. Which is NOT a protein filament in the Myofibril?
- Troponin
  - Calcium
  - Actin
  - Myosin
22. The two major anatomical subdivisions of the nervous system are
- The central nervous system and the peripheral nervous system
  - The cognitive nervous system and the performance nervous system
  - Neurons and neuroglia
  - Afferent division and efferent division
- 23 What is the function of the cardiovascular system?
- delivery
  - removal
  - transport
  - all of the above
- 24 The Endocrine system interacts with the nervous system by
- Secreting hormones which affect CNS neural metabolism
  - Modifying heart rate and blood pressure
  - Controlling the pace and depth of respiration
  - All of the above

**Section A continues over the page....  
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**Section A continued....**

- 25 The main difference between the Autonomic Nervous System and the Somatic Nervous System is that activities of the ANS are
- Primarily voluntary controlled
  - Primarily involuntary controlled
  - Involved in affecting skeletal muscle activity
  - Involved with carrying impulses to the CNS
26. The spinal cord is part of the
- PNS
  - ANS
  - SNS
  - CNS
27. Which does NOT relate to lower brain centres?
- Involuntary control
  - Reflexes
  - The cerebral cortex
  - The cerebellum and brain stem
- 28 The precision with which a biological control system maintains homeostasis is termed
- positive feedback
  - negative feedback
  - set point
  - gain
29. The primary ossification region of the long bone is
- Periosteum
  - Epiphyseal plate
  - Diaphysis
  - Epiphysis
30. Systole refers to
- the contraction phase of the cardiac cycle
  - the relaxation phase of the cardiac cycle

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- c. the entire duration of the cardiac cycle
- d.. the time in between consecutive heart beats

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**Section A continued....**

31. Which of the following is NOT part of the Lower Respiratory System?
- a. Larynx
  - b. Trachea
  - c. Pharynx
  - d. Bronchi
32. What does internal respiration mean?
- a. Taking a breath in
  - b. Gas exchange between blood and tissues
  - c. Gas exchange in the lungs
  - d. Pulmonary ventilation
33. Blood from the systemic circulation is returned to the right atrium by the:
- a. Superior and inferior vena cava
  - b. Pulmonary veins
  - c. Pulmonary arteries
  - d. Brachiocephalic veins
34. The heart's own electrical impulse regulator is known as the
- a. Atrio-ventricular node
  - b. Sino-atrial node
  - c. Bundle of HIS
  - d. Purkinje Fibre
35. The average resting heart rate for a general public population is:
- a. 20-30 beats per minute
  - b. 40-50 beats per minute
  - c. 60-70 beats per minute
  - d. 90-100 beats per minute

**END OF SECTION A**

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**Section B Answer ALL of the following questions**

1. Describe the term homeostasis and explain, using examples, the use of positive and negative feedback systems with reference to endocrine and neural responses.

**(8 Marks)**

2. Describe the process of muscle contraction, please refer to the three stages of Neuromuscular Transmission; Excitation Contraction Coupling; Sliding Filament Theory.

**(12 marks)**

3. Describe the characteristics of, and differences between compact and cancellous bone. Make reference to the functions that each bone type plays, and their location within the body.

**(8 Marks)**

4. Describe the pathway of blood flow around the systemic and pulmonary circulatory systems, beginning from the left ventricle.

**(7 marks)**

**END OF QUESTIONS**