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UNIVERSITY OF GREATER MANCHESTER

SCHOOL OF HEALTH SCIENCE & SOCIETY

BSc (HONS) BIOMEDICAL SCIENCE

SEMESTER ONE EXAMINATION 2025/2026

ANATOMY AND PHYSIOLOGY

MODULE NO: BIO4011

Date: Monday 12 January 2026 **Time: 10.00 am – 12.00pm**

INSTRUCTIONS TO CANDIDATES:

There are 62 questions.

Answer ALL questions.

Marks for parts of questions are shown in brackets.

There are a total of 100 marks available

The pass mark is 40%

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1. Which of the following describes the correct sequence of blood flow?

    a. Pulmonary vein, right ventricle, right atrium, pulmonary artery.
    b. Vena cavae, left atrium, left ventricle, aorta.
    c. Pulmonary vein, left atrium, left ventricle, aorta.
    d. Aorta, left atrium, left atrium, pulmonary artery.

1 mark

2. What is the name of the contractile unit of a muscle?

    a. Myofibril.
    b. Sarcomere.
    c. Myocyte.
    d. Myosin.

1 mark

3. Which types of muscle are involuntary?

    a. Cardiac & Smooth muscle.
    b. Skeletal &Cardiac muscle.
    c. Smooth & Skeletal muscle.
    d. Striated & Smooth muscle.

1 mark

4. What is the circulation between the heart and the body is known as

    a. Pulmonary circulation.
    b. Coronary circulation.
    c. Systemic circulation.
    d. Systolic circulation.

1 mark

5. During 60 minutes of submaximal exercise, the body temperature reaches a plateau after 35 – 45 minutes. What is this an example of?

    a. Homeostasis
    b. Effector centre
    c. Steady state
    d. Changing internal environment

1 mark

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6. What is the myelin sheath around muscles is vital for?

a. Sensing heat & pain.
b. Releasing acetylcholine.
c. Generating an action potential.
d. Fast transmission of impulses.

1 mark

7. What is the name of the connective tissue sheath that surrounds bundles of muscle fibres?

a. Sarcolema.
b. Perimysium.
c. Epimysium.
d. Endomysium.

1 mark

8. Name the structures that prevent backflow of blood between the chambers of the heart.

a. Atrioventricular valves.
b. Ventricoatrial valves.
c. Ventricoarterial valves.
d. Atrioarterial valves.

1 mark

9. Which components of a control system assesses input and initiates a response?

a. Integrating centre.
b. Stimulus.
c. Effector.
d. Receptor.

1 mark

10. What component divides a Sarcomere?

a. Myofilaments.
b. M lines.
c. Z lines.
d. Neuromuscular junctions.

1 mark

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11. What is the name of the protein that forms the ‘thick’ filaments in skeletal muscle tissue?

    a. Myosin.
    b. Collagen.
    c. Sarcomere.
    d. Actin.

1 mark

12. Within the human body where is most of the blood distributed at rest?

    a. Venous system.
    b. The heart.
    c. Arterial system.
    d. The lungs.

1 mark

13. The accuracy with which a biological control system maintains homeostasis is termed

    a. Positive feedback.
    b. Negative feedback.
    c. Set point.
    d. Gain.

1 mark

14. On a Monark cycle ergometer a pedalling cadence of 60 revolutions per minute against a resistance of 2kg would result in what work rate?

    a. 90 watts.
    b. 120 watts.
    c. 60 watts.
    d. None of the above.

1 mark

15. Which blood vessels contain thin muscular walls to prevent backflow?

    a. Arterioles.
    b. Veins.
    c. Capillaries.
    d. Arteries.

1 mark

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16. Where does the Calcium released in muscle tissue to stimulate actin and myosin interaction flow from?

    a. Cytoplasm.
    b. Sarcoplasmic reticulum.
    c. Muscle spindle,
    d. Golgi tendon organ.

1 mark

17. Which of the following is part of the systemic circulation system?

    a. Alveoli.
    b. Left atrium.
    c. Right atrium
    d. Bronchioles.

1 mark

18. What is the term used to describe the volume of air expired on each breath?

    a. Pulmonary ventilation rate.
    b. Maximum voluntary ventilation.
    c. Stroke volume.
    d. Tidal volume.

1 mark

19. What would be the long-term effect of aerobic exercise?

    a. Decreased stroke volume.
    b. Decreased cardiac output.
    c. Increased blood pressure.
    d. Decreased blood pressure.

(1 mark)

20. The movement of air in and out of the lungs is called?

    a. Capillary diffusion.
    b. Pulmonary ventilation.
    c. Pulmonary diffusion.
    d. Gas exchange.

(1 mark)

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21. Acetylcholine (Ach) is

a. One of the major waste products generated by muscle contraction.
b. The neurotransmitter that is released from motor nerves.
c. The chemical energy source for muscle contraction.
d. The enzyme that catalyses the splitting of ATP in a muscle fibre.

1 mark

22. Name the small air-filled sacks within the lungs?

a. Bronchi.
b. Alveoli.
c. Pores of Kohn.
d. Pulmonary capillaries.

1 mark

23. What is the most common operational action in control systems?

a. Positive feedback.
b. Thermostatic control.
c. Negative feedback.
d. Stimulus response.

1 mark

24. What supplies the energy required for muscle contraction?

a. Inorganic phosphate (Pi).
b. ATP.
c. ADP.
d. ATPase.

1 mark

25. Oxygen diffusion across the respiratory membrane from the alveoli occurs via what component?

a. Pulmonary capillaries.
b. Veins.
c. Small bronchioles.
d. The heart.

1 mark

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26. Which factor determines gas exchange rate through the respiratory membrane?

    a. Surface area.
    b. Pressure differential.
    c. Thickness.
    d. All of the above.

1 mark

27. What provides information about blood pressure during contraction phase of the cardiac cycle?

    a. Systolic blood pressure.
    b. Mean arterial pressure.
    c. Diastolic blood pressure.
    d. Heart rate.

1 mark

28. How can slow twitch fibres be described?

    a. Employed in high intensity activities.
    b. Use the CP (creatine phosphate) system.
    c. Are employed in low intensity activity.
    d. Have poorer blood supply than other muscle fibres.

1 mark

29. What term describes the amount of air left in the lungs after a maximal expiration?

    a. Total lung capacity.
    b. Expiratory volume.
    c. Forced ratio volume.
    d. Residual volume.

1 mark

30. What are the two proteins responsible for skeletal muscle contraction?

    a. Fibrin & pepsin.
    b. Myosin & actin.
    c. Actin & adenosine.
    d. Collagen & elastin.

1 mark

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31. What type of exercise are Fats the dominant fuel?

a. Low intensity cardiovascular exercise.
b. Moderate intensity cardiovascular exercise.
c. High intensity cardiovascular exercise.
d. High intensity resistance exercise.

1 mark

32. Following gaseous exchange, approximately what percentage of carbon dioxide is expelled from the lungs?

a. 0.4%.
b. 4%.
c. 14%.
d. 24%.

1 mark

33. Normal blood pressure at rest can be identified as being?

a. 100mmHg for systolic & 60mmHg for diastolic pressure.
b. 80mmHg for systolic & 100mmHg for diastolic pressure.
c. 130mmHg for systolic & 85mmHg for diastolic pressure.
d. 80mmHg for systolic & 160mmHg for diastolic pressure.

1 mark

34. Which muscle fibres contains the greatest number of mitochondria?

a. FTa fibres.
b. FTx fibres.
c. FTa & FTx fibres.
d. ST fibres.

1 mark

35. What is a typical minute ventilation during light activity?

a. 1 litre.
b. 3 litres.
c. 8 litres.
d. 35 litres.

1 mark

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36. A concentric muscle contraction is one in which the muscles do what action?

a. Lengthens as contractile force is generated.
b. Shortens but no contractile force is generated.
c. Stays the same length as contractile force is generated.
d. Shortens as contractile force is generated.

1 mark

37. On each breath approximately how much of the inspired volume is dead space?

a. 50 ml.
b. 150 ml.
c. 100 ml.
d. 500 ml.

1 mark

38. What describes the process of gaseous exchange in the lungs?

a. Oxygen diffuses into the alveoli.
b. Carbon dioxide diffuses into the alveoli.
c. Carbon monoxide diffuses into the alveoli.
d. Nitrogen diffuses into the alveoli.

1 mark

39. Where is the sinoatrial node located?

a. Left atrium.
b. Left ventricle.
c. Right atrium.
d. Right ventricle.

1 mark

40. What is the inherent heart rate as established by the SA node?

a. 100 bpm.
b. 90 bpm.
c. 80 bpm.
d. 70 bpm.

1 mark

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41. What is the name of the bundle of fibres connecting the AV node to the left and right bundle branches?

    a. Purkinje fibres.
    b. Bundle of His.
    c. Sinoatrial node.
    d. Interventricular septum.

1 mark

42. What does the large P wave on an ECG trace indicate?

    a. Atrial contraction.
    b. Atrial relaxation.
    c. Ventricular relaxation.
    d. Ventricular contraction.

1 mark

43. Ventricular systole makes up how much of the cardiac cycle at rest?

    a. One third.
    b. One quarter.
    c. One half.
    d. One fifth.

1 mark

44. What is the name given to the dilation of muscle arterioles and capillaries to override vasoconstriction?

    a. Excitation coupling.
    b. Cardiac drift.
    c. Frank Starling mechanism.
    d. Autoregulation.

1 mark

45. What does the QRS complex on an ECG trace indicate?

    a. Atrial contraction
    b. Atrial relaxation
    c. Ventricular contraction
    d. Ventricular relaxation

1 mark

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46. Changes in muscular tension are detected by what structural feature?

a. Golgi tendon organ.
b. Motor neuron.
c. Motor unit.
d. Muscle spindle.

1 mark

47. During heavy exercise what would be a typical cardiac output?

a. 2 l/ min.
b. 5 l/ min.
c. 8 l/ min.
d. 20 l/ min.

1 mark

48. Sympathetic nerves innervate which part of the heart?

a. Atria.
b. Ventricles.
c. Atria and ventricles.
d. The coronary arteries.

1 mark

49. During heavy exercise to what structure(s) are the majority of the blood flowing?

a. Skeletal muscle.
b. Skin.
c. Heart.
d. Lungs.

1 mark

50. What is a typical oxygen consumption value at rest?

a. 0.25 l/ min
b. 1.50 l/ min
c. 12 l/ min
d. 80 l/ min

1 mark

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51. During mastication saliva helps break down what constituent?

a. Carbohydrates.
b. Proteins.
c. Minerals.
d. Fats.

1 mark

52. How many calories does 5 grams of protein provide?

a. 10 kcal.
b. 15 kcal.
c. 20 kcal.
d. 25 kcal.

1 mark

53. What is the role of the stomach during digestion?

a. Absorbs carbohydrate into the blood.
b. Releases hydrochloric acid to kill bacteria.
c. Releases insulin and glucagon.
d. Absorbs vitamin B and K.

1 mark

54. Excessive saturated fat in the diet has been implicated as a risk factor for which disease?

a. Heart disease.
b. Asthma.
c. Arthritis.
d. Eczema.

1 mark

55. The anaerobic capacity for boys and girls is not fully developed until what age?

a. 5.
b. 10.
c. 15.
d. 20.

1 mark

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56. The body replaces around how much of its skeleton per year?

a. 10%.
b. 1%.
c. 50%.
d. 20%.

1 mark

57. Basal metabolic rate (BMR) is

a. The total amount of energy needed every day.
b. The minimum amount of energy required for physical activity.
c. The minimum amount of energy to sustain essential daily bodily functions.
d. The energy required to support digestion.

1 mark

58. Which of the following would be most beneficial for reducing the loss of bone mass associated with osteoporosis?

a. Swimming.
b. Cycling.
c. Walking.
d. Rowing.

1 mark

59. What is the name of the cells that build bone?

a. Osteoclasts.
b. Osteoblasts.
c. Osteoporosis.
d. Osteopenia.

1 mark

60. How many stages to the life cycle are there

a. 5.
b. 3.
c. 2.
d. 8.

1 mark

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61. Describe the physiological pathway for systemic and pulmonary circulation of blood flow beginning from the left ventricle. Make reference to the oxygenated status of the blood, structures through which the blood passes and how the blood is moved through the circulatory system.

20 marks

62. Describe how the body maintains a homeostatic balance of core body temperature when exposed to a cold environment. In your answer refer to the components of a control system and how these interact to maintain body temperature.

20 marks

END OF QUESTIONS