[SS03]

UNIVERSITY OF BOLTON

SCHOOL OF CLINICAL AND BIOMEDICAL SCIENCES

BSc(Hons) BIOMEDICAL SCIENCE

SEMESTER ONE EXAMINATION 2024/25

ANATOMY AND PHYSIOLOGY

MODULE NO BIO4011

Date: Monday 13th January **Time: 14.00 – 16.00**

INSTRUCTIONS TO CANDIDATES: **There are 62 questions.**

Answer all questions in your answer book, not on the question paper.

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 of the following types of muscle are involuntary?

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

1 mark

4. 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. This is an example of

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

1 mark

6. The myelin sheath is vital for

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

1 mark

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7. The connective tissue sheath that surrounds bundles of muscle fibres is called the

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

1 mark

8. Structures that prevent backflow of blood between the chambers of the heart are?

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

1 mark

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

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

1 mark

10. Sarcomeres are divided by

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

1 mark

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. Where is most of the blood distributed at rest?

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

1 mark

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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 a work rate of

    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

16. Calcium release in muscle tissue to stimulate actin and myosin interaction flows from the

    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. The volume of air expired on each breath is called

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

1 mark

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19. Which of the followings is 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

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. What is the name of 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. The energy required for muscle contraction is supplied by

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

1 mark

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25. Diffusion of oxygen from the alveoli across the respiratory membrane occurs via

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

1 mark

26. Which of the following is a factor that determines gas exchange rate through the respiratory membrane

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

1 mark

27. Which of these gives information about blood pressure during the contraction phase of the cardiac cycle

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

1 mark

28. Slow twitch fibres are

    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. The amount of air left in the lungs after a maximal expiration is called

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

1 mark

30. The two proteins responsible for skeletal muscle contraction are

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

1 mark

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31. Fats are the dominant fuel for

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 less than

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

36. A concentric muscle contraction is one in which

a. The muscle lengthens as contractile force is generated.
b. The muscle shortens but no contractile force is generated.
c. The muscle stays the same length as contractile force is generated.
d. The muscle shortens as contractile force is generated.

1 mark

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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. Which of the following 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

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

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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. The QRS complex on an ECG trace indicates

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

1 mark

46. Changes in muscular tension are detected by the

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

1 mark

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47. Which of the following is a typical cardiac output during heavy exercise

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. Where is the majority of the blood flow during heavy exercise

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

1 mark

50. What is a typical resting oxygen consumption

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

1 mark

51. During mastication saliva helps break down

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

1 mark

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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. During digestion the stomach

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

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

1 mark

55. The anaerobic capacity for boys and girls is not fully developed until the age of

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

1 mark

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

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

1 mark

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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 path that blood takes through the systemic and pulmonary circulations, starting first at the left ventricle. Make reference to the oxygenated status of the blood, each structure 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