**ST MARY’S UNIVERSITY**

**TWICKENHAM, LONDON**

MSc Degree Examination students registered for

Level **SEVEN**

Title: **Clinical Physiology and Pathology**

Code: **PHP 7002**

Semester: **ONE**

Date: **January 9th 2019**

Time: **9:30 – 11:30AM**

TIME ALLOWED: **TWO** HOURS

**Section 1:** Please answer **ALL** multiple choice questions by answering A, B, C or D on the answer sheet provided. All multiple choice questions are worth one mark each (30 marks).

**Section 2:** Please answer 8 short answer questions in the answer book provided; complete all questions in sections A, B and C and choose two questions from section D. All questions are worth 5 marks each (40 marks).

**Section 3:** Long answer question, worth 30 marks. Please select one question from the choice of three and write in the answer book provided (30 marks).

Section One

Please answer all of the multiple-choice questions, which are worth one mark each (30 questions).

1. Please select the correct answer: Ribosomes are formed in the nucleolus, migrate to cytoplasm and may assemble in groups called polyribosomes.
   1. True
   2. False
2. Please select the INCORRECT statement:
   1. Plasma membrane is a lipid bilayer that is composed of a double layer of phospholipids, carbohydrates and proteins arranged in a fluid mosaic structure.
   2. Integral proteins go completely through the membrane wall whilst peripheral proteins remain on the surface of the membrane.
   3. Rough endoplasmic reticulum synthesises lipids and steroids and helps drug detoxification.
   4. Mitochondria have a smooth outer membrane whilst the inner folds form shelf-like protrusions known as cristae.
3. All of these are methods of intracellular communication except:
   1. Contact dependant
   2. Paracrine
   3. Endocrine
   4. Exocrine
4. Increases in C02 concentration in the blood causes:
   1. an increase in hydrogen ions, increasing pH and decreasing rate and depth of respiration.
   2. an increase in hydrogen ions, decreasing pH and increasing rate and depth of respiration.
   3. None of the above.
   4. Both of the above.
5. Which statement about tissue healing is NOT correct?
   1. Histamine is released by mast cells and causes vasodilation
   2. Neutrophils are granulocytes and are used for initial phagocytosis
   3. Bradykinins stimulate clot formation
   4. Macrophages stimulate angiogenesis
6. Which statement is NOT correct during haemostasis:
   1. Platelets are formed from red blood cells and circulate in the blood stream
   2. Blood vessel vascular spasm is initiated by endothelins
   3. Von Willebrand factor helps formulate the platelet plug
   4. Platelets contain granules including prostaglandins and ADP
7. Which statement below is CORRECT when considering the secondary coagulation cascade:
   1. Extrinsic pathway initiates from damage to blood vessel walls
   2. Fibrinogen forms fibrin in the presence of Thrombin during the common pathway
   3. Fibrin on its own is a stable molecule
   4. Intrinsic pathway usually starts with factor III
8. Which statement about bone structure is NOT correct:
   1. Blood vessels travel in a system of central Haversian canals to form an osteon
   2. Osteocytes synthesise bone matrix by secreting osteoid which mineralises in a two- step process, the vesicular and fibrillary phases
   3. Osteoblasts are derived from mesenchymal stromal (stem) cells
   4. Osteocytes make up 90-95% of total bone cells
9. Select the statement that is NOT correct about cartilage:
   1. The primary structural and functional unit of articular cartilage is a chondron, made up of chondrocytes and the pericellular matrix
   2. Perichondrium has a vascular outer fibrous layer and inner chondrogenic (cellular) layer
   3. The extracellular matrix is maintained by chondrocytes and contains type II collagen for tensile strength and durability
   4. Cartilage has a rich blood supply which supplies nutrition directly to cartilage
10. Please select the INCORRECT statement about osteoporosis:
    1. It is a disease characterised by a decrease in bone mass that occurs when bone resorption exceeds formation
    2. Histologically, osteoporosis has a reduction in thickness of compact bone and number and size of trabeculae in cancellous bone
    3. RANK/RANKL pathway promotes bone resorption
    4. Osteoprotegerin (OPG) is an agonist to RANK/RANKL and increases bone resorption
11. Please select the correct statement. The cell membrane of a muscle fibre is called:
    1. Myofibril
    2. Sarcolemma
    3. Sarcoplasm
    4. Myofilament
12. Please select the INCORRECT statement regarding the neuron:
    1. Acetylcholine is the neurotransmitter which is released into the synaptic cleft of motor neurons innervating a muscle fibre
    2. Action potentials travel along t-tubules within myofibres
    3. The release of calcium from sarcoplasmic reticulum binds to tropomyosin to initiate muscle fibre contraction
    4. Cross bridge formation occurs between actin and myosin filaments
13. Please select the INCORRECT statement regarding sarcopenia:
    1. Described as the gain of skeletal muscle mass, strength and function with age
    2. Is associated with decreases in satellite cell density
    3. It is implicated in increased mortality rates in the elderly
    4. Is a reduction of type II myofibres more than type I
14. A 35-year old female presents to you with a gradually enlarging asymptomatic swelling in front of her neck. Which structure and condition is likely to be involved?
    1. Parathyroid; a sign of hypercalcemia
    2. Pituitary; Cushings disease
    3. Thyroid; Graves disease
    4. Diabetes Mellitus Type I; beta cell damage
15. Please select the correct answer from the statements below regarding the nervous system: Myelin sheaths are made in the peripheral nervous system by:
    1. Oculomotor cells
    2. Schwann Cells
    3. Oligodendrocytes
    4. Ependymal cells
16. Please select the INCORRECT answer. When coordination testing during neurological assessment:
    1. Poor coordination suggests damage to the cerebrum
    2. Finger- to –nose test is used for upper limb coordination testing
    3. The difficulty of testing can be increased with the eyes closed
    4. Patient can be seated during testing
17. Please select the INCORRECT answer. When testing light touch during a neurological assessment:
    1. Testing 10 sites allows quantification within a dermatome
    2. Unilateral lesions would show changes along a spinal nerve root or peripheral root
    3. Bilateral lesions show damage to the PNS
    4. It should be light so that you don’t stimulate the mechanoreceptors
18. Please select the INCORRECT answer below when considering neurological function and pathology.
    1. Basal ganglia is responsible for sensory information and memory.
    2. Dopaminergic neurons in the substantia nigra pars compacta (SNc) degenerate progressively in Parkinson’s disease, leading to dopamine deficiency.
    3. Dementia is a syndrome of global disturbance of higher mental function and has been linked to the 4 A’s: amnesia, aphasia, agnosia, apraxia.
    4. Vascular dementia is often considered like a series of mini strokes affecting cognition and physical function
19. Please select the correct statement below about the cardiovascular system: Arteries and veins share the same general features, however walls of veins are much thicker because of the higher pressure of blood that flows through them.
    1. True
    2. False
20. Please select the correct statement regarding cardiac function. Coronary arteries supply the myocardium with nutrients and remove metabolic waste for the heart. Blood enters it the coronary arteries from the:
    1. left atrium
    2. right ventricle
    3. mitral valve
    4. tricuspid valve
21. Please select the correct statement regarding cardiac function. Most blood enters the ventricle of the heart during:
    1. Atrial systole
    2. Atrial diastole
    3. Ventricular systole
    4. Isovolumic contraction
22. Please select the INCORRECT statement regarding blood pressure testing:
    1. Sounds are heard through a stethoscope as cuff pressure of a sphygmomanometer is gradually lowered
    2. Sounds are first heard when cuff pressure falls just below or equals systolic pressure
    3. Sounds stop when cuff pressure falls below diastolic pressure
    4. No sounds with full cuff pressure means cuff is below dyastolic pressure
23. Select the INCORRECT statement regarding the respiratory system:
    1. Bronchial epithelium in the lungs can metabolise airborne carcinogens
    2. Nasal conchae prevent dehydration of nasal epithelium by trapping water during exhalation
    3. Paranasal sinus warms and humidify incoming air into the respiratory system
    4. Mucus is produced by specialised epithelial cells called cilia
24. Respiratory system, choose the answer which is NOT correct:
    1. Active transport is the main method for gaseous exchange in the respiratory membrane
    2. Alveolar sacs are clusters of individual alveoli responsible for gaseous exchange
    3. Alveolar pores help maintain equal air pressure throughout the alveoli and the lung
    4. Pulmonary surfactant is composed of phospholipids and proteins and reduces surface tension of alveoli
25. Please select the INCORRECT statement about regulation of respiration:
    1. The respiratory centres are divided into four major groups, two in the medulla (dorsal and ventral respiratory groups) and two in the pons (pneumotaxic and apneustic centres)
    2. The medullary rhythmicity area controls the basic rhythm of respiration and includes inspiratory centre and expiratory centres
    3. Apneustic area transmits inhibitory impulses to the inspiratory centre to prevent over-inflation of lungs
    4. Chemical regulation of respiration is via the blood concentration levels of CO2, H+/pH and oxygen.
26. Please select the correct statement below regarding the respiratory system. Which of the following prevents alveoli from collapsing?
    1. Residual volume
    2. Tidal volume
    3. Expiratory reserve volume
    4. Inspiratory reserve volume
27. Please select the INCORRECT statement regarding the renal system and Angiotensin II:
    1. Is a potent vasodilator
    2. It reduces renal blood flow limiting fluid loss and preserving blood volume
    3. Aldosterone is released from the adrenal cortex in response to angiotensin II
    4. Angiotensin II activation and secretion is stimulated by decreases in blood pressure
28. Please select the INCORRECT answer below regarding kidney failure:
    1. Acute kidney failure can develop rapidly (within several days) if fluid balance is not maintained in the body
    2. Acute kidney failure is a life threatening pathology and is associated with high mortality rates
    3. Chronic kidney failure is easily diagnosed early in the disease process.
    4. Chronic kidney disease can be managed with lifestyle and medication but may result in dialysis or kidney transplant
29. Please select the INCORRECT statement about the immune system:
    1. Bacteria can be killed by antibiotic usage
    2. Colds are caused by bacterial infection
    3. Innate immune response is non-specific and uses macrophages, dendritic cells and natural killer lymphocytes
    4. Specific immune response uses cell mediated and humoral mediated immunity.
30. Which of these organs is NOT considered an accessory digestive structure?
    1. Mouth
    2. Salivary glands
    3. Pancreas
    4. Liver

Section Two (5 marks each)

Please answer **ALL** the questions from categories A, B and C and then select any **TWO** from section D. Please write the answers in the booklet provided.

**Category A: Musculoskeletal systems**

1. Compare and contrast active vs passive transport of ion channel gates. Give an example of each and explain how they work. (5 marks)
2. Describe the bone remodelling cycle and explain how it is a balancing act. (5 marks)

**Category B Cardiovascular and Respiratory systems**

1. Describe ventilation and perfusion from the cardiovascular system to the lungs. Explain the consequence of a ventilation/perfusion mismatch. (5 marks)
2. Explain what is meant by the term ‘lung compliance’ and describe what happens when lungs have reduced compliance? (5 marks)

**Category C Neurological system**

1. Describe the structure and function of the Golgi tendon organ. Contrast the function with that of a muscle spindle. (5 marks)
2. Describe the main ascending tracts communicating sensory information to the central nervous system (CNS). Explain how the sensory information is processed in the CNS. (5 marks)

**Category D**

1. Explain the how the hypothalamus and pituitary contribute to the endocrine system. Where and how are hormones produced? (5 marks)
2. Using graph format, describe the four stages of an action potential, include the ion and anions involved and direction of flow. (5 marks)
3. List the roles of calcium in the body and explain how it is regulated and stored. (5 marks)
4. Describe the process of mitosis and compare it to meiosis. (5 marks)

Section D:

Long answer question.Please answer **ONE** out of **THREE.**

1. Outline the classification of the nervous system. Describe the function of the autonomic nervous system. (30 marks)
2. Describe the mechanical and histological properties of ligaments. Explain the overlapping phases of ligamentous healing and give local and global factors that affect each phase. (30 marks)
3. Discuss the causes, signs and symptoms and potential consequences of asthma and how it affects normal respiratory structure and function of the lungs. (30 marks)

**END OF EXAMINATION**