**ST MARY’S UNIVERSITY**

**TWICKENHAM, LONDON**

MSc Degree Examination students registered for

Level **SEVEN**

Title: **Clinical Physiology and Pathology**

Code: **PHP 7002**

Semester: **RESIT**

Date: **3rd July 2019**

Time: **09:30-11:30 AM**

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 2 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 state the correct answer below: in transcription, the molecule of mRNA is synthesised in the cytoplasm according to DNA, producing an mRNA codon.
   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. Peripheral proteins go completely through the membrane wall whilst integral proteins remain on the surface of the membrane.
   3. Smooth 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. Decreases in C02 concentration in the blood causes:
   1. an decrease 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
4. Which statement about tissue healing is NOT correct?
   1. Histamine is released by mast cells and causes vasoconstriction
   2. Neutrophils are granulocytes and are used for initial phagocytosis
   3. Bradykinins stimulate vasodilation
   4. Macrophages stimulate angiogenesis
5. Please select the correct statement: which two cascades occur during the inflammation stage of healing?
   1. Extrinsic and intrinsic
   2. Vascular and cellular
   3. Non-extrinsic and non-intrinsic
   4. Non-vascular and non-cellular
6. Which statement is NOT correct during haemostasis:
   1. Platelets are fragments formed from megakaryocytes
   2. Vascular spasm is initiated by circulating nitrous oxide in the blood vessels
   3. Von Willebrand factor helps formulate the platelet plug
   4. Platelets contain granules including prostaglandins and ADP
7. Which statement below is INCORRECT when considering the secondary coagulation cascade:
   1. Intrinsic pathway initiates from damage to blood vessel walls
   2. Fibrinogen forms fibrin in the presence of Thrombin during the common pathway
   3. Fibrin is a stable molecule
   4. Extrinsic pathway usually starts with factor III
8. Which statement about bone structure is NOT correct:
   1. Osteoblasts are derived from Mesenchymal stromal (stem) cells
   2. Osteoblasts synthesise bone matrix by secreting osteoid
   3. Osteoid is a gel-like substance that becomes mineralised
   4. osteoblasts make up 90-95% of total bone cells
9. Which of these statements are NOT correct regarding embryonic ossification?
   1. Intramembranous ossification occurs from mesenchymal cells which differentiate into osteogenic cells then osteoblasts and form ossification centres
   2. Bones which form from intramembranous ossification are the skull and clavicles
   3. At birth, bones are made up mainly cartilage with primary ossification centres only
   4. In endochondral ossification bone replaces hyaline cartilage
10. 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. Fibrocartilage has Type I collagen and Type II collagen
    3. Cartilage is a frictionless, lubricating and loadbearing surface that supports and distributes forces generated during loading.
    4. Cartilage remodels itself every 7-10 years in adults
11. Please select the correct 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 inhibits bone resorption
    4. Osteoprotegerin (OPG) is an antagonist to RANK/RANKL and decreases bone resorption
12. Please select the correct statement. Myosin is a double helix polypeptide chain which contain 4 heads per myosin molecule.
    1. True
    2. False
13. Please select the INCORRECT statement regarding sarcopenia:
    1. Described as the loss of skeletal muscle mass, strength and function with age
    2. Is associated with increases 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. Select the INCORRECT statement about the endocrine/exocrine system:
    1. Exocrine system secretes products like sweat and digestive enzymes
    2. Endocrine system has ducts and produces a chemical secretion by the gland
    3. Endocrine system has no ducts and produces hormones which are released into the interstitial fluid where they diffuse into the blood
    4. Endocrine system only targets specific cell function
15. Please select the correct answer from the statements below regarding the nervous system: Myelin sheaths are made in the central nervous system by:
    1. Oculomotor cells
    2. Schwann Cells
    3. Oligodendrocytes
    4. Ependymal cells
16. The autonomic nervous system does what under stressful conditions?
    1. Upregulates the sympathetic nervous system
    2. Upregulates the parasympathetic nervous system
    3. Constricts blood vessels
    4. Upregulates bowel and bladder function
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 CNS
    4. It should be firm so that you don’t stimulate the mechanoreceptors
18. The spinothalamic tract is responsible for the following sensation except:
    1. Pain
    2. Proprioception
    3. temperature
    4. crude touch
19. 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
20. Please select the correct statement regarding cardiac function. Most blood leaves the ventricles of the heart during:
    1. Atrial systole
    2. Atrial diastole
    3. Ventricular systole
    4. Isovolumic contraction
21. Which statement about cardiac function is NOT correct?
    1. Bradycardia is a resting heart rate drop below 60bpm
    2. Bradycardia occurs at rest in healthy individuals and is not usually clinically significant
    3. Tachycardia is defined as heart rate above 100bpm
    4. Tachycardia occurs at rest in healthy individuals and is not usually clinically significant
22. Please select the correct statement regarding cardiac function. Cardiac output is the heart rate (beats per minute) multiplied by stroke volume (blood ejected by each ventricle with each beat):
    1. True
    2. False
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 cools incoming air into the respiratory system
    4. Mucus is produced by specialised epithelial cells called goblet cells
24. Which of the following statements about the respiratory system is INCORRECT?
    1. Diffusion 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 increases 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 pons area controls the basic rhythm of respiration and includes inspiratory centres and expiratory centres
    3. Pneumotaxic 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. When ventilation is not sufficient, which of the following occurs?
    1. The capillary dilates
    2. The capillary constricts
    3. The partial pressure of oxygen in the affected alveolus increases
    4. The bronchioles dilate
27. Please select the correct statement about the renal system. Water reabsorption or loss can be controlled through changes in permeability of:
    1. Collecting ducts
    2. Proximal convoluted tubule
    3. Distal convoluted tubule
    4. Ascending loop of Henle
28. Most absorption occurs in which part of the nephron?
    1. Ascending loop of Henle
    2. Proximal convoluted tubule
    3. Descending loop of Henle
    4. Distal convoluted tubule
29. Please select the correct answer below. B cells are immune cells that produce antibodies while T cells do not secrete antibodies.
    1. True
    2. False
30. What are the four basic digestive processes?
    1. Motility, secretion, digestion, absorption
    2. Motility, secretion, digestion, excretion
    3. None of the above
    4. All of the above

**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. Explain how action potentials occur in skeletal muscle and contrast them that to smooth muscle. What are the main differences? (5 marks)
2. List and describe the features of the stages of fracture healing (5 marks)

**Category B Cardiovascular and Respiratory systems**

1. Describe the cardiac cycle (5 marks)
2. Outline the differences in respiratory acidosis and alkalosis incorporating the relevant buffering system. Explain how they relate to signs and symptoms? (5 marks)

**Category C neurological system**

1. Explain what the Circle of Willis is and the functions it performs in the cerebral circulation. (5 marks)
2. What are the structures that protect the brain? How does each function? (5 marks)

**Section D**

1. Describe the structure and function of the Golgi tendon organ.  Contrast the function with that of a muscle spindle. (5 marks)
2. Explain how the hypothalamus and pituitary contribute to the endocrine system. Where and how are hormones produced? (5 marks)
3. Describe the processes involved in ventilation and perfusion from the cardiovascular system to the lungs. Explain the consequences of a ventilation/perfusion mismatch. (5 marks)
4. Describe the process of mitosis. Do all cells replicate? (5 marks)

Section 3:

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

1. Outline the components of the central nervous system. Describe the function of each of the component parts and how they relate to each other. (30 marks)
2. What are prostaglandins and what are their roles in tissue damage and healing? (30 marks)
3. Discuss the causes, signs and symptoms and potential consequences of chronic obstructive pulmonary diseases (COPD) and how it affects normal respiratory function of the lungs. (30 marks)

**END OF EXAMINATION**