

PROGRAM : *BIOMEDICAL TECHNOLOGY*

SUBJECT : **ANATOMY AND PHYSIOLOGY 1**

CODE : **APA 1111**

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MODERATOR : MRS A. KADER

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INSRUCTIONS : THIS QUESTION PAPER MUST BE RETURNED WITH THE
MULTIPLE CHOICE ANSWER SHEET AND THE EXAMINATION
SCRIPTS

REQUIREMENTS : 1 X EXAMINATION SCRIPTS
1 X MULTIPLE CHOICE ANSWER SHEET

INSTRUCTIONS TO CANDIDATES:

1. THIS PAPER CONSISTS OF 3 SECTIONS.

SECTION A CONSIST OF MULTIPLE CHOICE QUESTIONS THAT MUST BE
ANSWERED ON THE **MULTIPLE CHOICE ANSWER SHEET** PROVIDED.

SECTIONS B & C MUST BE ANSWERED IN ONE **EXAMINATION SCRIPT** PROVIDED.

2. THIS QUESTION PAPER MUST BE RETURNED WITH YOUR EXAMINATION SCRIPTS
AND MULTIPLE CHOICE ANSWER SHEET.

SECTION A

Answer the following questions on the multiple choice answer sheet provided. Read the instructions carefully and select the single, most correct answer for each question.

- 1) Arrange the following list of levels of organisation from the smallest level to the largest level.

1. tissue
2. cell
3. organ
4. organelle
5. organism
6. organ system

- A) 2, 4, 1, 3, 6, 5
- B) 4, 2, 1, 3, 6, 5
- C) 4, 2, 1, 6, 3, 5
- D) 4, 2, 3, 1, 6, 5
- E) 2, 1, 4, 3, 5, 6

- 2) The maintenance of a constant and optimal internal environment in an organism is termed:

- A) positive feedback.
- B) homeostasis.
- C) negative feedback.
- D) effector control.
- E) integration.

- 3) The bladder, ureter and kidneys are associated with the _____ system.

- A) skeletal
- B) muscular
- C) renal
- D) endocrine
- E) both B and C

- 4) Which of the following structures are lateral to the nose?

- A) eyes
- B) mouth
- C) ears
- D) chin
- E) both A and C

- 5) The simplest chemical units of matter are:

- A) atoms.
- B) molecules.
- C) protons.
- D) neutrons.
- E) electrons.

-
- 6) Ionic bonds are formed when
- A) atoms share electrons.
 - B) electrons are completely transferred from one atom to another.
 - C) a pair of electrons is shared unequally by two atoms.
 - D) hydrogen forms bonds with negatively charged atoms in the same or different molecule.
 - E) two or more atoms lose electrons at the same time.
- 7) Which of the following statements about water is **NOT** correct?
- A) it is composed of polar molecules
 - B) it is responsible for about 2/3 of the mass of the human body
 - C) it has a relatively low heat capacity
 - D) it can be considered a 'universal solvent'
 - E) it contains hydrogen bonds
- 8) Inorganic compounds that are soluble and whose ions will conduct an electrical current are called :
- A) hydrophobic.
 - B) electrolytes.
 - C) covalent bonds.
 - D) polar covalent molecules.
 - E) hydration spheres.
- 9) The watery medium that surrounds a cell is called :
- A) cytosol.
 - B) protoplasm.
 - C) extracellular fluid.
 - D) cytoplasm.
 - E) a colloidal gel.
- 10) Which of the following is NOT a function of membrane proteins?
- A) binds to ligands
 - B) regulates the passage of ions
 - C) as carrier molecules for various solutes
 - D) anchors or stabilizers for the cell membrane
 - E) normally produce energy
- 11) Most of the ATP required to power cellular operations is produced in the _____
- A) ribosomes.
 - B) endoplasmic reticulum.
 - C) nucleus.
 - D) mitochondria.
 - E) Golgi apparatus.
- 12) A solution that contains a lower solute concentration than the cytoplasm of a cell is called :
- A) merotonic.
 - B) hypertonic.
 - C) isotonic.
 - D) hypotonic.
 - E) homotonic.

13) A transitional epithelium would be found

- A) lining the urinary bladder.
- B) lining the ducts that drain sweat glands.
- C) lining kidney tubules.
- D) lining the stomach.
- E) at the surface of the skin.

14) Which of the following membranes line cavities that communicate with the exterior of the body?

- A) mucous
- B) serous
- C) cutaneous
- D) synovial
- E) pleural

15) A gland composed of cells arranged in a blind pocket with a single duct that does not branch would be called

- A) simple tubular.
- B) simple acinar.
- C) compound tubular.
- D) compound alveolar.
- E) tubuloacinar.

16) Examination of a tissue sample reveals groups of cells united by junctional complexes and interlocking membranes. The cells have one free surface and lack blood vessels. The tissue is most likely _____ tissue.

- A) muscle
- B) neural
- C) epithelial
- D) connective
- E) adipose

17) Each of the following is a function of the integumentary system, **EXCEPT**

- A) protection of underlying tissue.
- B) excretion of salts and wastes.
- C) maintenance of body temperature.
- D) synthesis of vitamin C.
- E) storage of nutrients.

18) Accessory structures of the skin include all of the following, **EXCEPT**:

- A) hair follicles.
- B) sebaceous glands.
- C) sweat glands.
- D) epidermis.
- E) nails.

- 19) An epidermal layer found only in the skin of the palms of the hands and the soles of the feet is the
- A) stratum corneum.
 - B) stratum lucidum.
 - C) stratum germinativum.
 - D) stratum granulosum.
 - E) stratum spinosum.
- 20) The fibrous protein that is responsible for the strength and water resistance of the skin surface is
- A) collagen.
 - B) eleidin.
 - C) keratin.
 - D) elastin.
 - E) keratohyalin.
- 21) Bone contains all of the following, **EXCEPT**
- A) calcium phosphate.
 - B) collagen fibers.
 - C) calcium carbonate.
 - D) chondroitin sulfate.
 - E) hydroxyapatite.
- 22) Which of the following is not a part of the axial division of the skeletal system?
- A) skull
 - B) auditory ossicles
 - C) hyoid bone
 - D) pectoral girdle
 - E) vertebral column
- 23) Which of the following is not a component of the appendicular skeleton?
- A) scapula
 - B) sacrum
 - C) femur
 - D) humerus
 - E) os coxae
- 24) A synovial joint is an example of a(n)
- A) synarthrosis.
 - B) amphiarthrosis.
 - C) diarthrosis.
 - D) symphysis.
 - E) syndesmosis.
- 25) Bursae may be located in all but which of the following areas?
- A) tendon sheaths
 - B) beneath the skin covering a bone
 - C) within connective tissue exposed to friction or pressure
 - D) around blood vessels
 - E) around most synovial joints

26) The major function of the sarcoplasmic reticulum in muscle contraction is to:

- A) make and store phosphocreatine.
- B) synthesize actin and myosin myofilaments.
- C) provide a source of myosin for the contraction process.
- D) regulate intracellular calcium concentration.
- E) store ATP .

27) The striations of a skeletal muscle cell are produced, for the most part, by:

- A) a difference in the thickness of the sarcolemma.
- B) the arrangement of myofilaments.
- C) the sarcoplasmic reticulum.
- D) the T tubules.
- E) the "cocked" positions of the heads of the thick filaments .

28) Ciliated neuroglia found in the central nervous system that play an active role in moving the cerebrospinal fluid are:

- A) Schwann cells.
- B) ependymal cells.
- C) oligodendrocytes.
- D) astrocytes.
- E) microglia.

29) The term central nervous system refers to the:

- A) autonomic and peripheral nervous systems.
- B) brain, spinal cord, and peripheral nerves.
- C) brain and spinal cord.
- D) spinal cord and spinal nerves.
- E) brain and sensory nerves.

30) A hormone that helps to regulate the sodium ion concentration of the blood is

- A) cortisol.
- B) parathormone.
- C) thymosin.
- D) somatotropin.
- E) aldosterone.

31) When blood glucose levels fall

- A) insulin is released.
- B) glucagon is released.
- C) peripheral cells take up more glucose.
- D) protein synthesis decreases.
- E) both B and C

32) The adrenal medulla produces

- A) androgens.
- B) glucocorticoids.
- C) mineralocorticoids.
- D) catecholamines.
- E) corticosteroids.

33) Which of the following statements is **INCORRECT**?

- A) The contractions of skeletal muscles pull on tendons and move bones of the skeleton.
- B) Skeletal muscles are responsible for controlling the openings of the digestive and urinary tracts.
- C) Skeletal muscles are responsible for the pumping action of the heart.
- D) Skeletal muscles support the weight of some internal organs.
- E) Skeletal muscle contractions help maintain body temperature.

34) The functional unit of a skeletal muscle fiber is the

- A) sarcolemma.
- B) sarcomere.
- C) sarcoplasmic reticulum.
- D) myofibril.
- E) myofilament.

35) The area of the sarcomere containing the thick filaments is the

- A) Z line.
- B) M line.
- C) H band.
- D) A band.
- E) I band.

36) The area of the sarcomere that contains only thin filaments is the

- A) Z line.
- B) M line.
- C) H band.
- D) A band.
- E) I band.

37) The increase in muscle tension that is produced by increasing the number of active motor units is called

- A) incomplete tetanus.
- B) complete tetanus.
- C) treppe.
- D) wave summation.
- E) recruitment.

38) Hormones known as 'catecholamines' are

- A) lipids.
- B) peptides.
- C) steroids.
- D) derivatives of amino acids.
- E) produced by reproductive glands.

39) Which of the following is **NOT** a function of the neuroglia?

- A) support
- B) information processing
- C) secretion of cerebrospinal fluid
- D) isolation of neurons
- E) phagocytosis

40) In the spinal cord, white matter is organized into ascending and descending tracts grouping into

- A) nuclei.
- B) ganglia.
- C) columns.
- D) nerves.
- E) horns.

41) The _____ of each spinal nerve provides sensory and motor innervation to the skin and muscles of the back.

- A) white ramus communicantes
- B) gray ramus communicantes
- C) dorsal ramus
- D) ventral ramus
- E) dermatomes

42) Visual and auditory information are processed by the

- A) medulla oblongata.
- B) pons.
- C) mesencephalon.
- D) diencephalon.
- E) cerebellum.

43) Receptor specificity can be the result of all of the following, **EXCEPT**

- A) the structure of the receptor cell.
- B) characteristics of the receptor cell membrane.
- C) accessory cells that function with the receptor.
- D) accessory structures and tissues that shield the receptors from other stimuli.
- E) tissue location of the receptor cell.

44) In the autonomic nervous system,

- A) the lower motor neurons directly innervate effector organs.
- B) there is always a synapse between the CNS and the effector organ.
- C) motor neurons do not synapse but are connected by gap junctions.
- D) the cell bodies of all motor neurons are found in ganglia outside of the CNS.
- E) neurons have dendrites but no axons.

45) Olfactory glands

- A) contain neural receptors for the sense of smell.
- B) form the basement membrane of the olfactory epithelium.
- C) are sensitive to aromatic molecules in the air.
- D) produce a pigmented mucus that covers the olfactory epithelium.
- E) form structures called olfactory bulbs.

46) Taste buds are monitored by cranial nerves

- A) IX, X, XI.
- B) VII, VIII, IX.
- C) VII, IX, X.
- D) V, VII, IX.
- E) IX, XI, XII.

47) The pigmented portion of the eye is the

- A) conjunctiva.
- B) cornea.
- C) iris.
- D) pupil.
- E) canal of Schlemm.

48) Steroid hormones

- A) are proteins.
- B) cannot diffuse through cell membranes.
- C) bind to receptors in the nucleus of their target cells.
- D) remain in circulation for relatively short periods of time.
- E) are transported in the blood dissolved in the plasma.

49) The alpha cells of the pancreas produce

- A) insulin.
- B) glucagon.
- C) renin.
- D) cortisol.
- E) digestive enzymes.

50) A rise in cortisol would cause an increase in each of the following except the

- A) rate of glucose synthesis by the liver.
- B) rate of glycogen formation by the liver.
- C) level of fatty acids in the blood.
- D) fatty acid metabolism by muscle cells.
- E) ACTH levels.

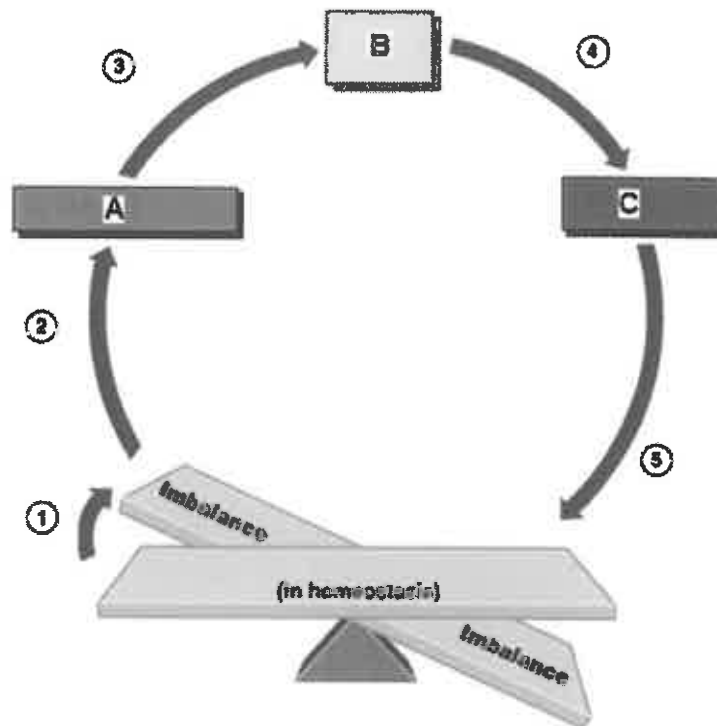
SUBTOTAL SECTION A: 50

SECTION B

Answer this section in a *SEPARATE* answer script. Label the cover of this script, *SECTION B*. Ensure that you number your answers exactly as the questions are numbered

QUESTION ONE – INTRODUCTION TO ANATOMY AND PHYSIOLOGY

1.1. Use the diagram below to describe the five steps involved in homeostatic regulation. (5 x 1 = 5)



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1.2. Provide the correct anatomical term for each of the following:

(3 x ½ = 1½)

- 1.2.1. Eye
- 1.2.2. Hand
- 1.2.3. Elbow

1.3. Provide the correct directional term/cavity for each of the following:

(3 x ½ = 1½)

- 1.3.1. The oris is found _____ to the nasus.
- 1.3.2. The gluteal region is found _____ to the pubic region
- 1.3.3. The brain is found in the _____ cavity.

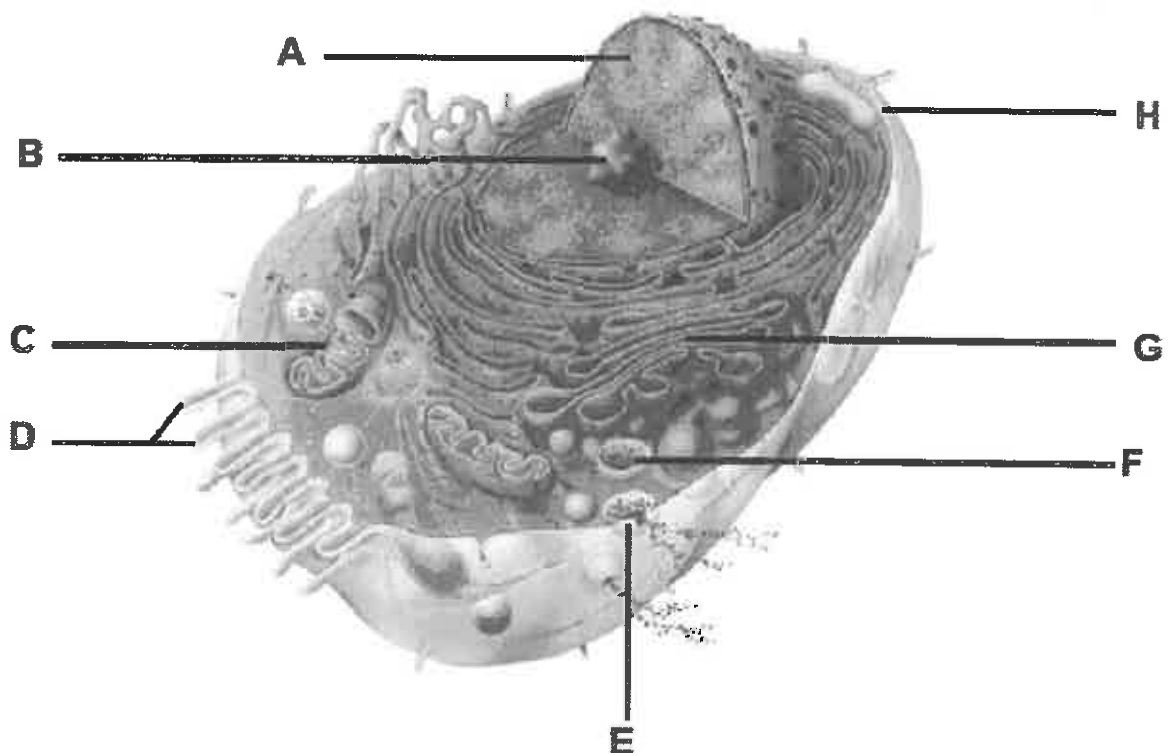
[8]

QUESTION TWO – BASIC CHEMISTRY

- 2.1. List any **FOUR** properties of water. (4 x ½ = 2)
- 2.2. List **TWO** functions for each of the following organic compounds.
- 2.2.1. Carbohydrates (2 x ½ = 1)
- 2.2.2. Lipids (2 x ½ = 1)
- 2.2.3. Proteins (2 x ½ = 1)
- 2.3. How does adenosine triphosphate (ATP) drive cellular work? (3 x 1 = 3)

[8]**QUESTION THREE – THE CELL**

3.1 Use the diagram below to answer each of the following questions.



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- 3.1.1. Identify structures B, C, D and G. (4 x ½ = 2)
- 3.1.2. What are the functions of structures C and G respectively? (2 x ½ = 1)

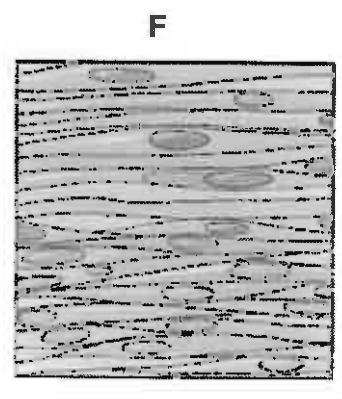
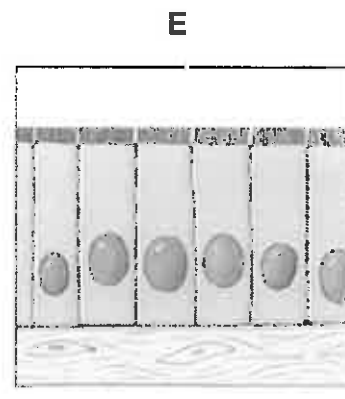
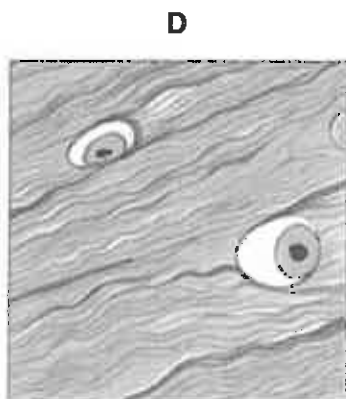
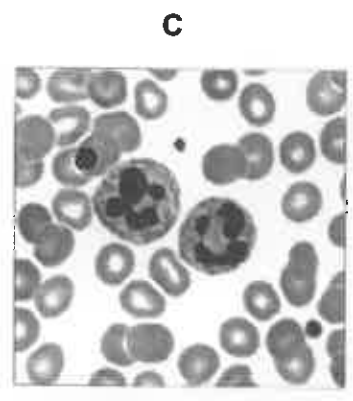
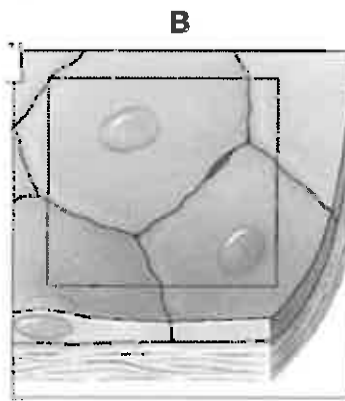
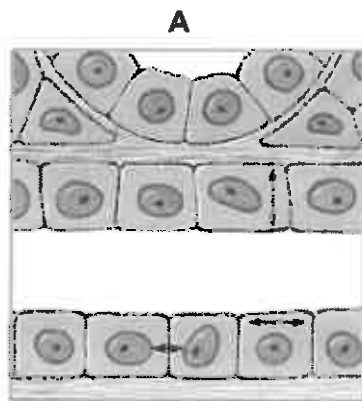
- 3.2. The following question concerns cell division. Select the correct term in Column B that corresponds with the description in Column A. You need only provide the question number and the letter of your chosen answer. (6 x ½ = 3)

Column A	Column B
3.2.1 The stage in a cell's life cycle in which the cell performs its normal functions and prepares for cell division.	A. Interphase B. Metaphase C. Spindle Fibers D. Telophase E. Prophase F. Chromatid G. Anaphase H. Centrioles
3.2.2 During this phase of cell division chromatids separate into daughter chromosomes which move to opposite ends of the cell.	
3.2.3 During this phase of cell division, chromatids line up at the centre of the cell.	
3.2.4 Structures that extend from the centrioles and function in moving chromatids.	
3.2.5 Two copies of each chromosome, connected by a centromere.	
3.2.6 During this phase of cell division, chromosomes and spindle fibers become apparent and the nuclear membrane disappears.	

[6]

QUESTION 4 – BASIC TISSUE

- 4.1 List the **FOUR** main types tissues found in the human body. (4 x ½ = 2)
- 4.2 Study the tissues below and answer the questions that follow:



4.2.1 Identify the specific tissues A – F. (6 x ½ = 3)

4.3 Give **ONE** example of where in the body the following tissues can be found:

- 4.3.1 A (½)
 4.3.2 B (½)
 4.3.3 D (½)
 4.3.4 F (½)

4.4 Explain **ONE** function of each of the following tissues:

- 4.4.1 C (1)
 4.4.2 D (1)
 4.4.4 F (1)

[10]

QUESTION 5 – THE INTEGUMENTARY SYSTEM

5.1. Name the **FOUR** different glands that are found in the skin and give **ONE** function of the secretions from each gland. (8 x ½ = 4)

5.2. List the **EIGHT** functions of the skin. (8 x ½ = 4)

5.3. Tabulate any **THREE** differences between apocrine glands and merocrine glands. (6 x ½ = 3)

[11]

QUESTION 6 – THE SKELETAL SYSTEM & ARTICULATIONS

6.1. State whether each of the following are true or false. (4 x ½ = 2)

- 6.1.1. The femur is an example of a long bone.
 6.1.2. The patella is an example of a short bone.
 6.1.3. The temporal bone is an example of a flat bone.
 6.1.4. The vertebrae are examples of irregular bones.

6.2. Name the **FOUR** different types of bone cells and provide **ONE** function for each. (8 x ½ = 4)

6.3. Match the joint in Column A to the correct term or description in Column B. You need only provide the question number and the letter of your chosen answer. (6 x ½ = 3)

Column A	Column B
6.3.1. Synarthrosis	A. First carpometacarpal joint
6.3.2. Amphiarthrosis	B. Bones connected by ligament
6.3.3. Gomphosis	C. Rotation of the axis and atlas
6.3.4. Syndesmosis	D. Slightly moveable joint
6.3.5. Pivot joint	E. Two bones bound by a rigid cartilage
6.3.6. Saddle joint	F. Immovable Joint
	G. Teeth bound to bony sockets by periodontal ligaments

[9]

SUBTOTAL SECTION B: 50

SECTION C**QUESTION ONE – THE MUSCULAR SYSTEM**

- 1.1 Name and describe any **TWO** functions of the muscular system. (4 x ½ = 2)
- 1.2 Identify and explain the **THREE** phases involved in a simple muscle twitch. (6)
- 1.3 Differentiate between isotonic and isometric contractions. (2 x 1 = 2)

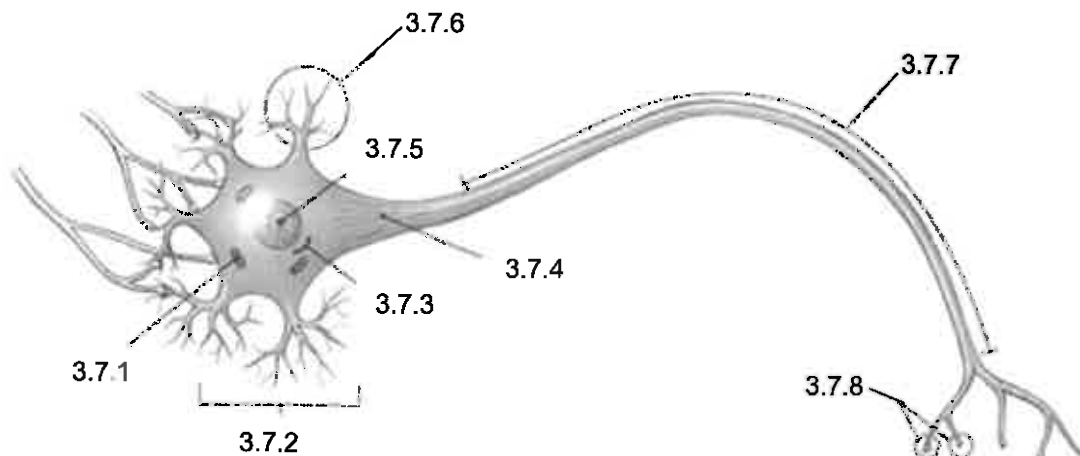
[10]**QUESTION TWO – THE ENDOCRINE SYSTEM**

- 2.1 Explain **THREE** mechanisms involved in controlling the release of hormones. Give **ONE** example of each mechanism. (6 x ½ = 3)
- 2.2 Name **TWO** hormones involved in short term stress management and state **FOUR** effects that these hormones will have on the body. (6 x ½ = 3)
- 2.3 Name **TWO** hormones that are produced by the ovaries and give a function of each. (4 x ½ = 2)
- 2.4 Classify hormones according to their chemical structure. (2)

[10]**QUESTION THREE – THE NERVOUS SYSTEM**

- 3.1 Tabulate **THREE** differences between graded and action potentials. (6 x ½ = 3)
- 3.2 Name **TWO** supporting cells in the peripheral nervous system and give **ONE** of their respective functions. (4 x ½ = 2)
- 3.3 Name the components of the pons and explain their respective functions. (2)
- 3.4 Give a brief summary of the physiological effects of parasympathetic activation. (4 x ½ = 2)
- 3.5 Differentiate between short term and tertiary long term memory. (2 x ½ = 1)
- 3.6 Provide the correct term(s) for the following descriptions. Write only the question number and correct answer in your answer book.
- 3.6.1 A specialized site where a neuron communicates with another cell. (½)
- 3.6.2 The gaps between Schwann cells in the peripheral system are called _____. (½)
- 3.6.3 Bundles of nerve fibers running through the CNS are called _____. (½)

- 3.6.4 The Golgi tendon organ and the muscle spindle are two specialized types of receptors called _____. (½)
- 3.6.5 The four major parts of the brain are the _____, the diencephalon, the brain stem, and the _____. (1)
- 3.6.6 The gray matter of the spinal cord is subdivided into _____. (½)
- 3.6.7 The large fiber tract that allows the two cerebral hemispheres to communicate is called the _____. (½)
- 3.6.8 The _____ branch of the autonomic nervous system causes dilation of blood vessels in skeletal muscle and the muscle of the heart. (½)
- 3.6.9 Period when the interior of the cell becomes less negative due to an influx of sodium ions. (½)
- 3.7 Name the structures labelled 1.2.1 – 1.2.8 below:



(8 x ½ = 4)

- 3.8 Name **TWO** cranial nerves that are involved in controlling eye movements. (2 x ½ = 1)

[20]

QUESTION FOUR – THE SENSES

- 4.1 Match the term in Column A to the correct description in Column B. Options may be used once, more than once, or not at all. You need only write the question number and the letter of your corresponding choice.

(6 x ½ = 3)

Column A	Column B
4.1.1 Nociceptors	A. Phasic receptors for detection of changes in temperature
4.1.2 Thermoreceptors	B. Osmolarity of blood fluids
4.1.3 Mechanoreceptors	C. Detects electromagnetic waves
4.1.4 Chemoreceptors	D. Hair cells
4.1.5 Visual receptors	E. Impulses carried by cranial nerve II
4.1.6 Equilibrium	F. Detects tissue damage

- 4.2 Describe the mechanism of hearing. (2½)

- 4.3 Draw the tongue and show the areas that are most sensitive to each of the specific **FOUR** primary taste sensations. (5 x ½ = 2½)

- 4.4 Name any **two** tunics of the eye and briefly describe their structure. (4 x ½ = 2)
[10]

SUBTOTAL SECTION C: 50

GRAND TOTAL: 150
