RUHS

First Year MBBS Examination

I MBBS PHYSIOLOGY PAPER I

Time: 3 hours Max Marks: 100

Date: 31-03-2023

Instructions: INSTRUCTIONS: Attempt all questions in both sections: (Use separate answer book for each section)

Section 1

1. Fill in the blanks: (6)

   a. Sodium enters the cell during the upstroke of the action potential and the major mechanism for removal and extrusion of Na+ from the cell in this instance is _____.

   b. The substance that contributes maximally to osmolality inside the cell is _____.

c. The phase of action potential caused by inactivation of Na+ channels in a nerve axon is known as _____.

d. _____. is the sensory system where the transducer and spike generator are located on the same cell.

e. he infant condition (as observed by parents) of _____. is most closely related to Slow-Wave Sleep (SWS).

f. Multiple sclerosis is a disease that attacks the _____. of neurones in the Central Nervous System (CNS).

2. Choose the correct option in the following multiple choice questions: (4)

a. A man falls into deep sleep with one arm under his head. After awakening the arm is paralyzed but tingling sensation and pain sensation persists. This loss of motor function without the loss of sensory function is due to; a) A Fibers are more susceptible to hypoxia than B Fibers. b) A Fibers are more sensitive to pressure than

C Fibers. c) C Fibers are more sensitive to pressure than A Fibers. d) Sensory Nerves are nearer bone and hence affected by Pressure.

b. When a normally innervated skeletal muscle is stretched the initial response is contraction, with increase in the stretch sudden relaxation occurs because of; a) Decrease in Gamma Efferent Discharge. b) Inhibition of the Discharge from Annulospiral Endings of Afferent Nerve Fibers. c) Decreased activity of afferent nerve fibers from Golgi Tendon Organs. d) Increased activity of afferent nerve fibers from Golgi Tendon Organs

c. Sweat in patients acclimatised to hot weather (as compared to patients in a temperature climate) contains less Na+ because: a) Takes longer for Na+ to be transported through sweat ducts. b) Aldosterone effect, causing a reduction in Na+ in sweat. c) Increased intake of water causing a reduction in Na concentration.

d) None of the above.

d. Which of the following is a feature of both the stretch reflex and the withdrawal reflex? a) Irradiation. b) After-discharge. c) Small afferent fibres. d) Reciprocal innervation.

3. Clinical Case Study (Clinical Case Description): A 30-year-old woman, with a 28-day menstrual cycle, consults her gynaecologist for various forms of barrier (15) methods, the patient now wants to. contraception. On having tried 'the pill' or an 'injection'. She further informs that she and her husband travel a lot and often forgets to take her prescribed antibiotics. From the cafeteria approach, the woman decides to try a long-acting depot injection of progesterone hormone, medroxyprogesterone (depo-progesterone). She is given the injection and instructed to follow up in 3 months for the next injection. Answer the following questions with diagrams wherever necessary. a) How do injectable hormones or hormone pills

provide contraception? b) Give the location of receptor for progesterone and enumerate mechanism of action of progesterone at cellular level. c) Define Exocytosis and explain the features of Exocytosis. d) Describe cellular physiology of second messenger system. c) Describe the various neurophysiological phases of a 28-day menstrual cycle of the said patient.

4. Write short notes on (Any five): (10)

   a. Humoral Immunity
   b. Rheobase and Chronaxie
   c. Metabotropic receptors
   d. Pituitary dwarf (C2-675)
   e. Myoglobin
   f. Receptor potential (C1-38)

5. Explain briefly (Any three): (15)

   a. Heat stroke
   b. Compound action potential
   c. Servo-controller mechanisms of glucose

homeostasis

d. Gibbs-Donnan equilibrium

Section 2

1. Define Diabetes Mellitus. Discuss in detail the physiological axes of glucose homeostasis and give the rationale of management profile of life style modifications in (20) Type 2 Diabetes Mellitus (T2DM).

2. What will happen and why (Any fivc): (10)

   a. Repeated stimulation of a skeletal muscle fibre result in sustained contraction leading to increased tension (Tetanus).

   b. A 38-year-old woman with myasthenia gravis notes an increase in muscle strength on treatment with neostigmine, an acetyl cholinesterase inhibitor.

   c. Elevated K+ concentration causes severe muscle weakness.

   d. Patient with Cushing's Disease has hyper-pigmentation.

   e. Oral glucose is more effective that intravenous glucose in releasing endogenous insulin.

f. The serum T3 levels are reduced in starvation.

3. Explain briefly (Any four): (20)

a. Type I skeletal Muscle Fibers
b. Myopia (C2-1105)
c. Functions of middle ear. (C2-1075)
d. Neural circuitry and functions of basal ganglia
e. Neurophysiology of sleep

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