BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE (PILANI), HYDERABAD CAMPUS

COMPREHENSIVE EXAMINATION, 1ST SEMESTER, 2022-23

BIO F313; ANIMAL PHYSIOLOGY

OPEN BOOK, *TOTAL MARKS 40M*

DATE: 24.12.22 TIME: 2:00-5:00 P.M.(AN) CB + OB = 180MIN

NOTE: NO MARKS WILL BE GIVEN WITHOUT JUSTIFICATION WHEREVER ASKED IN THE BELOW GIVEN QUESTIONS. PLEASE MENTION THE QUESTION NUMBER AND SUBSECTION CORRECTLY:

Q1. Consider a hypothetical situation where a cardiologist isolated hearts from two mice and kept them in two different ECF solutions, (**A)** and (**B),** and noted the following observation (assume rest all conditions remained the same):

(i) Solution **(A)** contained a **drug "X"** which increased the permeability of the SA node to K+ and resulted in decreased heart rate.
(ii) Solution **(B)** contained a **drug "Y"** which decreased the permeability of the SA node to K+ and resulted in a 35mL of end-systolic volume.

Purely on the above observations, answer the following questions: 18M

(a) From your knowledge of animal physiology name the possible second messenger pathway/molecule and its receptor (be specific) that is likely to be targeted by drug "X" which resulted in increased permeability of the SA node to the K+ ion. 2M
(b) Explain in detail how increased permeability of the SA node to K+ can cause a decrease in heart rate? 4M
(c) In an intact physiological system, **name the nervous system (be specific)** and the neurotransmitter which is released on its stimulation that mimics the effect of drug "X" on SA node permeability and decreases heart rate. 3M
(d) Name the possible second messenger pathway **and its receptor (be specific)** that was targeted by drug "Y" which resulted in a 35mL of end-systolic volume? 3M
(e) In an intact physiological system, **name the nervous system (be specific)** and the neurotransmitter which is released on its stimulation that mimics the effect of drug "Y" and causes a substantial decrease in end-systolic volume. 2M
(f) A hormone in your body is released in circulation and acts in a manner similar to that asked in Q1(e) i.e. causes a substantial decrease in end-systolic volume.

Name the hormone, and the gland which produces it, and also mention its effect on heart rate. (1+1 +2 = 4M)

Q2. A person met an accident and severely suffered head, face, and body injuries. After he was discharged from the hospital, the following were observed in his function: (3 + 2 +3 + 2 + 2 = 12M)

i. A complete loss of taste sensation
ii. Inability to move his tongue
iii. Inability to move his eyes in any direction
iv. Loss of balance and equilibrium
v. Inability to close the jaw.

In all the above listed 5 cases, **NAME THE SPECIFIC CRANIAL NERVE/(S) INJURED**:

Q3. A neurologist observed the presence of dense core vesicles from sections of axons under an electron microscope which he isolated from a given region of the mouse brain. These dense core vesicles contained larger molecules made up of 2-40 amino acids. From the above description: (2 + 2 +2 + 4 = 10M)

a. Name the substance/molecule which is stored in these dense core vesicles isolated from sections of axons.
b. Name the specific molecule which is normally found in neurons and packed in dense core vesicles but the same molecule is also secreted as a hormone by a part of the digestive system.
c. Name the part of the digestive system which produces/secretes it.
d. Mention its specific function/role in digestion.