YUSO 2017
Anatomy & Physiology
Exam Booklet

Do NOT write in this booklet. Fill in all your answers in the accompanying answer sheet.
Questions 1-8: Identify the following regions of the nervous system.

Question 9: What is the purpose of the spiky structure shown in the image to the right?

Question 10: White matter shown in the picture at right contains which of the following: Neuronal cell bodies, neuronal axons, Schwann Cells, Oligodendrocytes, Astrocytes, Satellite Cells, Microglia?

Question 11: List three infratentorial brain structures and three supratentorial brain structures.
Question 12: Describe the structure and location of denticulate ligaments.

Question 13: What specific structure attaches the cerebellum to the brainstem?

Questions 14-17: Identify the EEG from each stage of sleep

Questions 18-21: Name the correct pathology from each imaging study.
Question 22: A patient comes into the ER with a traumatic injury to the spine. He cannot move his legs, however, he is able to breathe independently. Below which vertebra must this patient have suffered a spinal injury?

Question 23: A patient visits their general physician suffering from numbness in the hand. The GP localizes loss of sensation to the pinkie and ring finger. In which anatomical region is the ulnar nerve being compressed?

Question 24: What are the two types of ganglia in the enteric nervous system?

Question 25: What is the primary inhibitory neurotransmitter, and the most abundant excitatory neurotransmitter?

Question 26: What are two voluntary actions of the autonomic nervous system?

Question 27: What is unique about the ganglia of the tenth cranial nerve?

Question 28: What membrane protein type is involved in the reception of nicotinic signals?

Questions 29-32: Below is an image of an experimental setup in which a giant squid’s neuron, up to 1 mm in diameter, very long, and visible on a macroscopic scale, is isolated and connected to electrodes.

29. What is the likely initial reading on the current monitor?

30. Suppose a strongly saline solution was introduced around the cell. How would the reading change?

31. How would the conduction velocity change if the neuron were twice as wide and twice as long?

32. The giant squid neuron is unmyelinated. What type of signal conduction is NOT present in this experiment?

Question 33: For two points, describe the longest human neuron:

Question 34: What pathogen causes shingles and where in the body does it reside?

Question 35: Deep Brain Stimulation is used to treat __________ disease.

Question 36: What are two histological findings of Alzheimer’s disease?

Question 37: What are three COMMON bacterial pathogens that cause conjunctivitis?
**Question 38:** A patient comes in with nonspecific neurological symptoms. You suspect they may have MS. For up to ten points, briefly outline how you would approach this case. Be sure to touch on symptoms, diagnostic tests, specific treatment modalities, and how you would counsel the patient about prognosis for full credit.

**Questions 39-44:** Each of the numbered red bars indicates a lesion along the optic tract. For each lesion, shade in areas of visual defect in each eye, using the circles provided as visual fields.

**Question 45:** As light hits the retina, which four types of cells does it pass through as it is transmitted into electrical impulses?

**Question 46:** Which cell type detects the highest frequency of light?

**Question 47:** The photoreceptive pigment in rod cells contains within it which prosthetic group, and where does this group come from?

**Question 48:** A gentleman finds that he is having trouble concentrating on his morning newspaper, and he is struggling with his favorite hobby, making fly fishing lures. He spends an increasing amount of time outside, playing catch with his grandchildren and driving on scenic routes. What visual defect might he be suffering from?
Question 49: What are three potential underlying causes for Nyctalopia? Additional correct answers will receive up to two bonus points.

Question 50: A patient is looking through the blinds on her window, and has difficulty reading the billboard across the street. When the blinds are open, she has no problem with this. Which visual pathology could she have?

Questions 51-54 refer to the image below.

51. What is the scientific name of the visual defect shown here?
52. What type of lens would be prescribed to correct this defect?

53. What is the scientific name of the visual defect shown here?
54. What type of lens would be prescribed to correct this defect?

Question 55: A student is in class listening to his teacher lecture with a loudness of 40 dB. Later that night, he goes to a concert by his favorite band and the intensity of sound is 10,000 times that of the classroom. What is the loudness of the concert in decibels?

Question 56: You are able to distinguish the difference in brightness between a 100W lightbulb and a 108W lightbulb. What is the minimum intensity that can be distinguished from a 200W lightbulb?

Questions 57-59: Name these structures in the ear that are necessary for sensing position and acceleration.
Question 60: Label on this schematic of the basilar membrane where high frequency sounds and low frequency sounds would cause vibration.

Questions 61-63: Identify these structures found in the skin.

61.

62.

63.

Question 64: What is the name of the secreted protein that activates itch-sensing nerve fibers?

Question 65: Name one of the modalities that nociceptors can respond to.

Question 66: A decreased threshold of pain in response to injury is called ____________________.

Question 67: You place your hand on the handle of a hot frying pan and immediately withdraw your hand without having to think about it. This is called a ____________________ and involves signals from your temperature receptors relayed to the ____________________.

Question 68: Odorants are detected by receptors cells located in the ____________________ and are relayed by axons to the ____________________ of the forebrain.
YUSO 2017 Anatomy & Physiology Examination

**Question 69:** What is the type of molecular receptor that detects odorant molecules?

**Question 70:** What are the five tastes able to be detected by the tongue?

**Question 71:** The surface of the tongue contains numerous bumps called ____________________.

**Questions 72-81:** Match each hormone with its description.

- A. Responsible for long-term stress response.
- B. Promotes water reabsorption in the kidneys to produce less urine.
- C. Secreted by the atria in response to high blood pressure.
- D. Promotes ovulation.
- E. Stimulates the kidney to reabsorb Na+ and secrete K+.
- F. Increases metabolic rate and temperature of the body.
- G. Promotes uterus contraction during labor.
- H. Stimulates the production of red blood cells.
- I. Secreted by D cells in the stomach to inhibit digestive processes.

72. Aldosterone  
73. TSH  
74. Vasopressin  
75. Oxytocin  
76. TH  
77. Cortisol  
78. LH  
79. Erythropoietin  
80. Somatostatin  
81. ANF

**Question 82:** Goiter is a swelling of the thyroid gland caused by a deficiency in ____________________.

**Question 83:** The girl in the left of the picture is older than her sister but has shown little growth and deficiency in bone and muscle mass. What hormone deficiency might she be suffering from?

**Question 84:** A patient comes to the clinic with symptoms of hyperactivity and restlessness, increased heart rate, and diarrhea. What hormonal disorder is this?

**Question 85:** A 40-year-old diabetic man who has been taking high doses of insulin experiences shakiness, sweating, and blurred vision before passing out. What side effect of his medication could have caused these symptoms?
Question 86: ____________________ diabetes is an inherited condition where the body destroys the insulin-producing cells in the pancreas. ____________________ diabetes is an acquired condition where the body loses its ability to respond to insulin.

Question 87: A diabetic patient arrives in the hospital with symptoms of thirst, fruity-scented breath, weakness, and confusion. Her blood pH is most likely ________________ (low, high, normal) because she is experiencing ________________.

Question 88: The hormone ____________________ is released in response to high blood sugar and causes ____________________ (increase, decrease, no change) in glucose uptake into cells. The hormone ____________________ is released in response to low blood sugar and causes ____________________ (increase, decrease, no change) in glucose uptake into cells.

Question 89: What is the name of the cells in the pancreas that produce insulin?

Questions 90-93: Identify the letter of the structure that fits the description.

90. Produces the hormone responsible for secondary sex characteristics.
91. Produces the hormone that causes the fight-or-flight response.
92. T-cells mature in this gland.
93. The posterior portion of this gland secretes oxytocin and ADH.