Multiple Choice. Read each question thoroughly before answering. From the choices available, choose the answer that is the most correct. Place all answers on the accompanying answer sheet. 2.3 points per answer

1. Which of the following general senses is not detected not sensed by receptors in the internal organs?
   a. pain  
   b. pressure  
   c. temperature

2. Which of the following is classified as a primary receptor?
   a. taste cell  
   b. Meissner corpuscle  
   c. hair cell of the organ of Corti  
   d. rod photoreceptor cell

3. When comparing the endocrine and nervous systems, the strength of the signal
   a. in the nervous system is controlled by the strength of the action potential.  
   b. is controlled by releasing hormones produced in the hypothalamus.  
   c. in the endocrine system is controlled by the quantity of hormone released.  
   d. in the endocrine system is controlled by the nervous system.  
   e. is related to fluid balance in the body.

4. Which of the following is considered a mixed function gland or organ that contains both hormone-producing cells and clusters of cells that do not produce hormones?
   a. anterior pituitary  
   b. pineal  
   c. thyroid  
   d. kidney  
   e. adrenals

5. Epinephrine is a ________ hormone.
   a. peptide  
   b. steroid  
   c. biogenic amine  
   d. protein

6. A hormone with a half life of ten days is mostly likely
   a. lipid-soluble hormone.  
   b. water-soluble hormone.  
   c. unable to tell from half life.

7. The anterolateral system of nerve tracts are pathways for
   a. motor instructions from the brain to the body.  
   b. sensory impulses from the body to the brain.  
   c. commissural fibers between portions of the cerebral gray matter.  
   d. hypothalamic hormones to the posterior pituitary.  
   e. none of these

8. Not including spinal cord interneurons, sensory nerve tracts use a ____ neuron system to convey conscious sensory information from the sensor to the cerebral cortex.
   a. one  
   b. two  
   c. three  
   d. four  
   e. five

9. The olfactory cortex is located in the
   a. frontal lobe.  
   b. parietal lobe.  
   c. temporal lobe.  
   d. occipital lobe.  
   e. insula.

10. The premotor area is located in the
    a. frontal lobe.  
    b. parietal lobe.  
    c. temporal lobe.  
    d. occipital lobe.  
    e. insula.

11. Which photoreceptor dominates the fovea centralis portion of the nervous tunic?
    a. rod cells  
    b. bipolar cells  
    c. amacrine cells  
    d. cone cells  
    e. horizontal cells

12. Taste buds consist of basal cells, supporting cells and
    a. hair cells.  
    b. ganglion cells.  
    c. paracrine cells.  
    d. taste cells.
13. Taste buds are
   a. located on three of the four types of tongue papillae.
   b. distributed over the entire surface of the tongue and portions of the pharynx.
   c. more concentrated in particular locations on the tongue like the tip and sides.
   d. help the human discriminate between substances that we need and those that might make us sick.
   e. all of the choices are correct.

14. Where is the location of the olfactory epithelium?
   a. on the papillae of the tongue   b. in the bony labyrinth   c. in the posterior chamber   d. in the nasal cavity

15. The visual association area is located in the
   a. frontal lobe.   b. parietal lobe.   c. temporal lobe.   d. occipital lobe.   e. insula.

16. The primary somatic sensory area is located in the
   a. insula.   b. precentral gyrus.   c. temporal lobe.   d. postcentral gyrus.   e. spinocerebellar lobe.

17. The dorsal-column/medial-leminiscal system of nerve tracts are pathways for
   a. motor instructions from the brain to the body.
   b. sensory impulses from the body to the brain.
   c. commissural fibers between portions of the cerebral gray matter.
   d. hypothalamic hormones to the posterior pituitary.
   e. none of these

18. Which body part has the greatest number of neurons in the primary somatosensory cortex dedicated to it?
   a. face   b. foot   c. shoulders   d. leg   e. each of these has an equal amount of dedicated cortex

19. Place the following in the order through which sound (waves and/or vibration) passes through them:

   1. tympanic membrane  2. ossicles  3. scala vestibuli  4. oval window  5. external auditory canal
   a. 3, 1, 2, 5, 4   b. 3, 1, 5, 4, 2   c. 5, 1, 2, 4, 3   d. 1, 2, 3, 5, 4   e. 5, 3, 4, 1, 2

20. Which of the following is an intrinsic eye muscle that controls the shape of the lens?
   a. helicotremata   b. ciliary body   c. meibomian gland   d. lacrimal sac   e. superior rectus

21. Which of the following values is the best estimate of the percent of visual input that crosses over via the optic chiasm?
   a. 100   b. 50   c. 25   d. 10   e. <1

22. Iodopsin
   a. exists in three forms each capable of responding to a particular wavelength of light.
   b. senses changes in light intensity and movement.
   c. is active in low light conditions.
   d. becomes inactive in bright light.

23. T/F. The lens projects an upside-down (inverted) image of an object in front of the eye on the retina.

24. Which ion causes the initial depolarization in the membranes of the rod photoreceptor?

25. Cutaneous senses are classified as
   a. general senses.   b. specific senses.   c. gustatory senses.   d. visceroreceptors.

a. it directly phosphorylates intracellular proteins
b. it catalyzes the conversion of ATP into cAMP
c. it catalyzes the conversion of GTP into GDP
d. it catalyzes the conversion of phosphoinositol bisphosphate into inositol triphosphate

27. T/F. The target cells of hormones typically possess the ability to respond to two or more hormones at the same time, if they don’t compete for the same receptor site.

28. What is the difference between primary sensory areas and sensory association areas?

a. primary areas interpret sensory input while association areas receive direct input from the sensor
b. primary areas receive the sensory action potentials while the association areas recognize it and compare it to past experience
c. the primary area links the sensory information to an interneuron at the appropriate level of the spinal cord, the interneuron synapses with the appropriate motor neurons to generate an appropriate response

29. The hair cells of the crista ampularis are embedded in the ________. Head movement causes stereocilia to bend.

a. otolithic membrane  b. perilymph  c. cupula  d. protein kinase  e. olfactory membrane

30. The semicircular canals are located within the ________ of the inner ear.

a. utricle  b. saccule  c. static labyrinth  d. dynamic labyrinth

31. Rotational movements of the head are sensed by sensors at the base of the

a. static labyrinth  b. semicircular canals  c. utricle  d. saccule  e. spiral organ

32. You are riding a bicycle down a winding path with your head up. Which sensor detects forward motion of the head as you speed up going down a hill?

a. maculae in the vestibule  b. semicircular canals  c. spiral organ  d. malleus and incus

33. Which ion causes the initial depolarization in the membranes of stereocilia of the spiral organ?

a. Na⁺  b. Ca⁺²  c. Cl⁻  d. K⁺  e. IP₃

34. To see an object up close, the lens of the eye

a. becomes flattened by contracting intrinsic eye muscles
b. becomes rounded by the contraction of the intrinsic eye muscles
c. vitreous humor production is increased to change the shape of the eye.
d. must be within 24 inches of the object.

35. Place the following in the order through which outside light passes through them:

1. aqueous humor  2. lens  3. cornea  4. ganglion cells  5. vitreous humor

a. 1, 2, 3, 4, 5  b. 5, 3, 4, 1, 2  c. 2, 1, 5, 3, 4  d. 1, 2, 3, 5, 4  e. 3, 1, 2, 5, 4

36. What is the cause of referred pain?

a. the cerebral cortex interacts with the basal nuclei and cerebellum in the planning, coordination and execution of movements
b. the skin is attached to the organ expressing pain, so the pain is felt at the skin
c. both the organ and the region of the skin input to the same spinal sensory tract leading to organ pain being felt at the skin
d. the process of referring to study guides, Seeley, and lecture notes when studying for an A&P exam.
37. Which of the following areas of the cerebral cortex is responsible for the motivation and foresight to plan and initiate appropriate movements?

a. precentral gyrus  
b. prefrontal association area  
c. premotor area  
d. corticobulbar tract

38. Because of its involvement in controlling fine movements of body parts like the hands, this pathway of motor nerve tracts is considered evolutionarily advanced.

a. direct pathway  
b. extrapyramidal system  
c. thoracolumbar system  
d. indirect pathway

39. The delay sometimes experienced between the release of a lipid soluble hormone and the response of the target cell

a. is the result of the time it takes for the slow-moving lipids to pass through the blood vessels.  
b. occurs due to the fact that lipid soluble hormones initiate protein synthesis to activate a biochemical pathway in a cell.  
c. happens because the intracellular mediator has to learn the story from both sides before making a decision.  
d. is because membrane receptor sites for the lipid soluble hormone are often blocked by protein-based hormones.

40. When comparing the endocrine system and the nervous system, the endocrine system generally

a. uses blood borne chemical messengers.  
b. is faster acting than the nervous system.  
c. produces effects that are shorter duration.  
d. produces more localized effects.

41. Hormones are released into the blood

a. at relatively constant levels  
b. in response to a stimulus  
c. in an episodic fashion  
d. all of these are possible forms of release

42. When calcium levels in the blood fluctuate, the thyroid and parathyroid glands secrete hormones to resist significant deviation from normal and stabilize the calcium levels. This is an example of which type of control over hormone secretion?

a. neural stimuli  
b. hormonal stimuli  
c. humoral stimuli  
d. direct innervation

43. Which type feedback is exemplified in the question above?

a. positive feedback  
b. negative feedback  
c. unable to tell from example given

44. Given the name, Spinothalamic tract, this nerve tract contains a pathway for

a. voluntary motor instructions from the brain to skeletal muscle.  
b. sensory impulses from the skin to the cerebral cortex.  
c. visual sensory impulses from the retina to the visual cortex.  
d. hypothalamic hormones to the posterior pituitary.  
e. none of these

45. The tertiary neuron in the spinothalamic tract is located between

a. a receptor and an interneuron in the spinal cord.  
b. the red nucleus and the cerebellum.  
c. a spinal cord interneuron and the thalamus.  
d. the thalamus and the primary somatosensory cortex.

46. The somatic sensory association areas are located in the

a. frontal lobe.  
b. parietal lobe.  
c. temporal lobe.  
d. occipital lobe.  
e. insula.

47. Which of the following endocrine glands releases its hormone in response to neural stimuli?

a. thymus  
b. thyroid  
c. anterior pituitary  
d. adrenal medulla
48. Lipid-soluble hormones
   a. stimulate new protein production in their target cells.
   b. activate the G protein mediated intracellular enzyme cascade.
   c. bind to membrane receptor proteins.
   d. breakdown quickly in the blood.

49. Up regulation of the cell’s response to a hormone is accomplished by
   a. altering the neurotransmitter released to reduce graded potentials.
   b. increasing the number of hormone receptors available.
   c. decreasing the availability of hormone receptors.
   d. phagocytizing membrane receptor proteins.

50. When rhodopsin is initially exposed to light,
   a. more rhodopsin is formed.     b. retinal separates from opsin.
   c. the cones generate action potentials.  d. free retinal is converted to vitamin A.
   e. retinal becomes more attached to opsin.

51. The auditory tube
   a. amplifies sound waves.     b. helps maintain balance.
   c. carries sound to the eardrum.  d. carries sound to the inner ear.
   e. equalizes air pressure between the middle ear and outside air.

52. During brain surgery, the superior portion of the primary somatic sensory cortex of a patient is stimulated. The patient is most likely to
   a. flex his fingers.     b. talk to the surgeon.     c. wiggle his toes.     d. feel something touching his back.

53. Which of the following is NOT a regulatory function of the endocrine system?
   a. Regulates water balance by controlling the solute concentration of the blood.
   b. Regulates skeletal muscle contraction strength.
   c. Regulates the levels of nutrients such as glucose in the blood.
   d. Regulates the rate of metabolism.
   e. Regulates the rate of growth.

Matching. From the choices provided, choose the best match for the following receptor types:

54. mechanoreceptor     55. chemoreceptor     56. thermoreceptor
57. photoreceptor      58. nociceptor     59. visceroreceptor
60. externoreceptor

a. associated with the skin, provide awareness of environment
b. stimulated by temperature; temperature extremes are sensed as pain
   c. located in the neural tunic of the eye
   d. dominate the area known as Broca
   e. a common receptor type, it responds to compression, bending, and stretching of cells
   f. consisting of both pain and pressure receptors, this grouping of receptors is associated with the internal organs
   g. also known as pain receptors or free nerve endings
   h. the taste cells of the taste buds are this type of receptor

continued
61. How is sensation different from perception? (Consider the differences between primary sensory cortex and association cortex areas.) Explain how the body accomplishes both using examples.

62. The primary somatosensory cortex is roughly organized into a map of the body but the size of each portion does not necessarily match the size of the body part mapped there. Why?

63. Consider the receptor proteins in the membranes of the taste cells. Present the three ways tastant molecules generate receptor potential in taste cells and relate to the perception of the five ‘tastes.’

64. Discuss the similarities and differences between the sensory structures used to detect the position of the head relative to gravity and the movement of the head.

65. The rod photoreceptor cells are only active in dim light, not bright light. State the physiologic reason for this.

66. Discuss the chemical structure, solubility, transport, duration, and receptor location of peptide/protein hormones and steroid/lipid hormones.