1. Synaptic inhibition is caused by:
   a. acetylcholine only
   b. depolarization of the post-synaptic membrane
   c. increased sodium permeability
   d. the EPSP phenomenon
   e. none of the above

2. Synaptic inhibition would be caused by:
   a. increased outward potassium diffusion
   b. depolarization of the post-synaptic membrane
   c. increased sodium permeability
   d. the EPSP phenomenon
   e. none of the above

3. Synaptic inhibition is caused by:
   a. depolarization of the post-synaptic neuron
   b. increased sodium permeability
   c. EPSP
   d. the hypothalamus exclusively
   e. none of the above

4. Which of the following transmitters is primarily in the PNS:
   a. acetylcholine
   b. glycine
   c. dopamine
   d. glutamic acid
   e. GABA

5. If acetylcholinesterase were inhibited or destroyed, acetylcholine should:
   a. also be inhibited
   b. reverse itself
   c. continue passing through the synaptic cleft, producing a sustained effect
   d. destroy the pre-synaptic ending
   e. return to the synaptic vesicles

6. Which of the following transmitters is limited to the spinal cord:
   a. acetylcholine
   b. norepinephrine
   c. glycine
   d. dopamine
   e. GABA

7. Natural opiate substances involved in some brain functions:
   a. catecholamines
   b. amines
   c. IPSP
   d. endorphins
   e. none of the above
8. The threshold depolarization of a particular post-synaptic site on a neuron being accomplished by the simultaneous firing of 6 EPSP pre-synaptic end bulbs, five times in rapid succession, would be termed:
   a. spatial
   b. temporal
   c. inhibitory
   d. localization
   e. spike

9. The threshold depolarization of a particular post-synaptic site on a neuron being accomplished by the simultaneous discharge (firing) of a group of 30 EPSP pre-synaptic end bulbs would be termed:
   a. spatial
   b. temporal
   c. inhibitory
   d. localization
   e. spike

10. Sufficient excitatory (stimulatory) transmitter release for an action potential to be generated at a post-synaptic site on a neuron, is accomplished by:
    a. spatial means
    b. temporal means
    c. both spatial and temporal means together, usually
    d. IPSP only
    e. unknown mechanisms

11. A neuronal pool which produces a series of separate impulses upon one particular post-synaptic neuron:
    a. inhibitory
    b. divergence
    c. localization
    d. reverberation
    e. afterdischarge

12. A neuron, in its post-synaptic role, receiving endings from many pre-synaptic axons is:
    a. sensory
    b. motor
    c. reverberation
    d. divergence
    e. convergence

13. A neuron which sends synapses back to one of its pre-synaptic neurons, is a part of which type of neuronal pool:
    a. convergent
    b. divergent
    c. reverberation
    d. afterdischarge
    e. bipolar

14. An EPSP's effect upon the post-synaptic membrane is caused by:
    a. potassium gates opening
    b. potassium gates closing
    c. chloride gates opening
    d. sodium gates opening
15. Inhibition of a post-synaptic site on a neuron is caused by:
   a. IPSP
   b. pre-synaptic inhibition
   c. inhibitory transmitter
   d. an increase in potassium or chloride permeability
   e. any of the above could describe the cause

16. An IPSP’s effect upon a post-synaptic membrane site would be caused by:
   a. opening of the potassium gates
   b. closing of the potassium gates
   c. opening of the sodium gates
   d. closing of the sodium gates
   e. closing of the chloride gates

17. The delay caused by a synapse is about:
   a. 0.5 millisecond (500 nsec.)
   b. 10 milliseconds
   c. 5 nanoseconds
   d. one second
   e. 0.5 second

18. The difference between IPSP and EPSP is produced by:
   a. different transmitters, or different post-synaptic membrane responses to the same transmitter
   b. different transmitters only
   c. the width of the synaptic cleft
   d. the speed of impulse conduction down the pre-synaptic neurons
   e. cerebellar interactions with the caudate nuclei, mediated by the insula and the mammillary body

19. Describe the resulting membrane potential when a particular post-synaptic site on a neuron is affected by a group of end bulbs in the following way (assume it started at resting): 150 EPSP’s + 80 IPSP’s:
   a. threshold
   b. sub-threshold
   c. supra-threshold
   d. hyperpolarization
   e. no change in potential

20. An example of how an afterdischarge type of neuronal pool is utilized:
   a. short-term memory
   b. long-term memory
   c. breathing
   d. to produce a series of impulses, one after the other
   e. to produce spatial summation

21. Describe the resulting membrane potential when a particular post-synaptic site on a neuron is affected by a group of end bulbs in the following way (assume it started at resting): 100 EPSP’s + 70 IPSP’s:
   a. threshold
   b. hyperpolarization
   c. sub-threshold depolarization
   d. resting potential
   e. no change
22. An example of how a reverberation type of neuronal pool is utilized:
   a. to produce muscle tetanization
   b. long-term memory
   c. to produce spatial summation
   d. a timing circuit, such as in determining the duration of breathing movements
   e. to produce temporal summation

23. A fundamental reason for the presence of synapses:
   a. there is a limit to the length of neurons
   b. they are absolutely necessary in order for a nervous impulse to be generated
   c. conservation of transmitters
   d. to balance the endocrine system
   e. to produce strategic delays in impulse transmissions

24. If chloride channel gates are opened when a resting potential exists, what will occur:
   a. hyperpolarization (IPSP)
   b. depolarization (EPSP)
   c. fatigue
   d. resting potential
   e. repolarization

25. All of the following are part of a synapse, except:
   a. end bulb
   b. node of Ranvier
   c. vesicles
   d. post-synaptic membrane
   e. cleft (gap)

26. In its pre-synaptic role, a neuron's axon endings being sent to synapse with many other neurons, is termed:
   a. sensory
   b. motor
   c. divergence
   d. convergence
   e. reverberation

27. A fundamental reason for the presence of synapses:
   a. to control the direction of impulses transmitted over various neurons
   b. they are absolutely necessary in order for a nervous impulse to be generated
   c. conservation of transmitters
   d. to balance the endocrine system
   e. there is a limit to the length of neurons

28. An example of how an afterdischarge type of neuronal pool is utilized:
   a. short term memory
   b. cause a series of successive impulses to produce muscle tetanization
   c. a timing circuit, such as in determining the duration of breathing movements
   d. to produce spatial summation of a post-synaptic site
   e. creation of a delay period, so that a post-synaptic site can recover from fatigue
29. Synapses contribute to which of the following:
   a. production of strategic delays in transmissions
   b. control the direction of impulses transmitted over different neurons
   c. transmittance of diverse information
   d. balancing stimulation and inhibition
   e. all of the above

30. A synapse is composed of:
   a. pre-synaptic end bulb
   b. transmitter within vesicles
   c. cleft (gap)
   d. post-synaptic membrane with receptors
   e. all of the above

31. Describe the resulting membrane potential when a particular post-synaptic site on a neuron is affected by a group of end bulbs in the following way (assume it started at resting): 40 EPSP's + 20 IPSP's:
   a. threshold depolarization
   b. sub-threshold depolarization
   c. supra-threshold depolarization
   d. hyperpolarization
   e. resting

32. The accumulation and release of a transmitter is the responsibility of:
   a. synaptic cleft (gap)
   b. post-synaptic receptors
   c. synaptic vesicles
   d. endoplasmic reticulum of the neuron's soma
   e. dendritic endings

33. Basically, the reason that inhibitory synapses are needed:
   a. cause secretion
   b. prevent excessive excitation and unwanted impulses
   c. enhance excitation, since EPSP's alone cannot produce sufficient depolarization for threshold to be reached
   d. produce overstimulation
   e. this is not known

34. Describe the resulting membrane potential when a particular post-synaptic site on a neuron is affected by a group of end bulbs in the following way (assume it started at resting): [2 (5 IPSP's)] + 35 EPSP's:
   a. hyperpolarized
   b. supra-threshold depolarization
   c. sub-threshold depolarization
   d. exactly threshold depolarization
   e. no change

35. A neuron, in its pre-synaptic role, sending its axon endings to many other neurons:
   a. divergence
   b. convergence
   c. reverberation
   d. sensory
   e. motor
36. Describe a post-synaptic site of a neuron being kept below threshold depolarization, not by the direct firing of more IPSP endings, but by the lack of sufficient firing by EPSP endings:
   a. pre-synaptic inhibition
   b. pre-synaptic excitation
   c. divergence
   d. convergence
   e. reverberation

37. If acetylcholine was not destroyed by the enzyme which normally disables it, then what would occur:
   a. continual depolarization
   b. permanent inhibition
   c. repolarization
   d. divergence
   e. nothing significant

38. A synapse with end bulbs contacting a post-synaptic site on the body of the other neuron:
   a. axo-dendritic
   b. axo-axonic
   c. axo-somatic
   d. soma-axonic
   e. dendro-dendritic

39. Which of the following is not true regarding a group of end bulbs which affect one post-synaptic site of another neuron:
   a. each causes a potential of 1mV
   b. they will be from endings of more than one axon
   c. only EPSP or IPSP types will be present
   d. both spatial and temporal methods will be utilized
   e. when no impulse is required, the site is kept depolarized just below threshold

40. A synapse with an end bulb contacting a post-synaptic site on a dendrite of the other neuron is called:
   a. axo-axonic
   b. axo-dendritic
   c. axo-somatic
   d. soma-axonic
   e. dendro-dendritic

41. One end bulb can produce how much potential change on a post-synaptic site:
   a. 1 mV
   b. 5 mV
   c. 10 mV
   d. 25 mV
   e. variable, but more than 25 mV

42. Inactive neurons are kept in a continually depolarized state, but just below threshold. This is:
   a. spike
   b. facilitation
   c. refractory period
   d. fatigue
   e. impossible, since a resting potential should always exist if a neuron is not currently carrying an impulse
43. What is the stimulus for transmitter release from an end bulb:
   a. post-synaptic reverse net ion flow
   b. active transport
   c. repolarization
   d. fatigue
   e. impulse over the pre-synaptic neuron

44. A synapse with an end bulb contacting a post-synaptic site on the axon of the other neuron:
   a. axo-dendritic
   b. axo-somatic
   c. axo-axonic
   d. soma-axonic
   e. dendro-dendritic

45. Which of the following end bulb firing situations would not be an example of spatial summation:
   a. 100 EPSP's + 4(20 IPSP's)
   b. 100 EPSP's + 50 IPSP's
   c. 100 EPSP's alone
   d. 100 EPSP's + 100 IPSP's
   e. actually all of the above are not spatial

46. The role of IPSP:
   a. sharpen responses
   b. limit responses
   c. maintain order
   d. permit feedback circuits
   e. all of the above

47. Which of the following end bulb firing situations would not be an example of temporal summation:
   a. 4(20 EPSP's) + 4(20 IPSP's)
   b. 4(20 EPSP's) + 100 IPSP's
   c. 20 EPSP's + 4(20 EPSP's)
   d. 50 EPSP's + 100 IPSP's
   e. 4(20 EPSP's) alone

48. Destruction of inhibitory synapses within the spinal cord would cause:
   a. complete paralysis
   b. desensitization to stimuli
   c. no predictable responses
   d. hypersensitivity and intense, widespread muscle responses
   e. adaptation

49. A logical grouping of neurons which performs a specific function:
   a. EPSP
   b. IPSP
   c. synapse
   d. neuronal pool
   e. spike
50. Which of the following would be utilized by a group of pre-synaptic end bulbs to collectively influence a post-synaptic neuron:
   a. spatial summation
   b. temporal summation
   c. EPSP
   d. IPSP
   e. all of the above, in combination

51. Describe the resulting membrane potential when a particular post-synaptic site on a neuron is affected by a group of end bulbs in the following way (assume it started at resting): 60 EPSP's and 30 IPSP's:
   a. threshold depolarization
   b. sub-threshold depolarization
   c. supra-threshold depolarization
   d. resting
   e. hyperpolarization

52. There are some neurons which are completely isolated, with no interconnections with other neurons.

53. All neurons in the body are interconnected with each other, directly or indirectly.

54. Each neuron in the body has direct or indirect connection with every other neuron.

55. Transmission across a synapse is accomplished by a chemical transmitter, contained within vesicles in the synaptic cleft.

56. IPSP's and EPSP's operate together to produce discrete, purposeful responses.

57. IPSP's are important for subduing and balancing stimulatory impulses, to prevent unwanted muscle contractions (for example).

58. EPSP's are important for subduing and balancing stimulatory impulses, to prevent unwanted muscle contractions (for example).

59. One synaptic end bulb can release sufficient transmitter to create a threshold depolarization on a sub-synaptic membrane site.

60. One synaptic end bulb could release sufficient transmitter to create a threshold depolarization on a post-synaptic membrane site, if sufficient facilitation exists.

61. A facilitated neuron is one in which hyperpolarization exists.

62. A facilitated neuron is one in which a subthreshold depolarization exists.
63. IPSP would be caused by increased potassium permeability of a post-synaptic membrane site.
64. An IPSP is caused by increased sodium permeability of a post-synaptic membrane site.
65. Membrane receptors for transmitters are located on the pre-synaptic portion of a neuron.
66. Neurons interconnect with each other via synapses.
67. Divergence describes a neuron in its post-synaptic role, in that it receives end bulbs from many other neurons.
68. A neuronal pool which produces tetanization of a muscle would be termed afterdischarge.
69. Divergence describes a neuron in its pre-synaptic role, in that its axon endings branch out to a number of other neurons.
70. One post-synaptic site will contain receptors controlling gates for sodium, potassium and chloride ions.
71. An end bulb is considered as being a pre-synaptic structure.
72. An end bulb is considered as being a post-synaptic structure.
73. A plexus is a logical grouping of neurons which performs a specific function.
74. Synaptic membrane receptors are within vesicles of the end bulb.
75. A particular transmitter may be found in either IPSP or EPSP synapses.
76. A neuronal pool is a logical grouping of neurons which performs a specific function.
77. In reality neurons often exhibit resting potentials.
78. In reality neurons never exhibit resting potentials, due to facilitation.
79. A neuronal pool which produces wave summation and tetany of a muscle would be termed reverberation.
80. A particular muscle is permitted to contract because all other muscles are being inhibited.
81. A dendro-dendritic synapse is not possible.