

**B.TECH DEGREE EXAMINATIONS: APRIL/MAY 2014**

(Regulation 2009)

Sixth Semester

**BIOTECHNOLOGY**

BTY213: Neurobiology and Cognitive Science

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 1 = 10 Marks)**

1. Some histological stains result in the cytoplasm of neurons containing large densely stained structures called Nissl bodies. These Nissl bodies are:
  - a) Breakdown products of cell metabolism
  - b) Stacks of rough endoplasmic reticulum
  - c) Nucleoli
  - d) Golgi Apparatus
2. The connected series of fluid-filled cavities that are found throughout the brain are known as the
  - a) Subarachnoid spaces
  - b) Rete mirabile
  - c) Vesicles
  - d) Ventricles
3. The reason(s) for unidirectional spread of action potentials is:
  - a) Inactivation of voltage-gated Na<sup>+</sup> channels
  - b) Opening of voltage-gated K<sup>+</sup> channels
  - c) Refractory period
  - d) All of the above
4. In neural coding, average number of spikes during short interval divided by duration of time interval is represented by
  - a) time dependent firing rate
  - b) spike count rate
  - c) rate coding
  - d) temporal coding
5. The critical event that promotes the fusion of a vesicle with the presynaptic membrane is
  - a) the efflux of potassium ions from the axon membrane
  - b) the arrival of an action potential at the dendritic membrane
  - c) The entry of calcium into the axon terminal
  - d) the movement of the membrane voltage to a more positive value
6. The primary means by which the postsynaptic action of acetylcholine is normally terminated is via
  - a) reuptake
  - b) enzyme inactivation
  - c) diffusion
  - d) sequestration into glial cells
7. The naked nerve endings are responsible for the sensation of
  - a) pain
  - b) touch

- c) hearing
  - d) vision
8. The action potential of skeletal muscle
  - a) has a prolonged plateau phase
  - b) spreads inwards to all parts of the muscle via T tubules
  - c) is longer than the action potential of cardiac muscle
  - d) is not essential for muscle conduction
9. Loss of fear and emotion is often observed in the lesion at
  - a) septal nucleus
  - b) thalamus
  - c) amygdaloidal nucleus
  - d) sensory cortex
10. Following statements are true for dopamine except
  - a) it is related to Parkinsonism
  - b) it is found in the cells uninhibited by Ach in basal ganglia
  - c) it is one of the endogenous opiates from CNS
  - d) cannot be replaced in CNS from dietary dopamine

**PART B (10 x 2 = 20 Marks)**

11. Define Blood brain barrier.
12. How does the process of myelination in CNS differ from PNS?
13. Compare between chemical and electrical synaptic transmission.
14. Define voltage dependent channels with an example.
15. Summarize the steps in synaptic transmission.
16. What is the effect of hormones on neuronal function? Give an example.
17. What are nociceptors?
18. Name some mechanoreceptors of the skin for touch sensation.
19. How will you correlate leptin levels in the body to feeding behaviour?
20. Contrast between declarative and non declarative memory.

**PART C (5 x 14 = 70 Marks)**

21. a) (i) Explain the process of neural development. (7)  
(ii) Discuss the process of myelination in detail with illustrations. (7)
- (OR)**
- b) (i) Elaborate the structure and functions of neurons. (10)  
(ii) How is cerebrospinal fluid formed? Add a note on its functions. (4)
22. a) (i) Illustrate the functioning of voltage dependent channels with an example. (9)

- (ii) Write a note on information representation by neurons. (5)
- (OR)**
- b) (i) Discuss the mechanism of conduction of action potential along the neuron. (10)
- (ii) Comment on electrical transmission. (4)
23. a) (i) Summarize the steps in synapse formation in detail. (7)
- (ii) Give an account on the hormonal effect on neuronal function. (7)
- (OR)**
- b) Discuss in detail the neurotransmitters, their release and their mechanism of action with an example.
24. a) (i) Elaborate on the mechanism of pain transduction. (8)
- (ii) Describe elaborately the neurological mechanisms of vision. (6)
- (OR)**
- b) (i) Write a detailed account on the mechanism of skeletal muscle contraction. (10)
- (ii) What are the organs of smell? Explain their role. (4)
25. a) (i) Explain in detail the neurological mechanisms that control feeding behaviour? (10)
- (ii) Discuss the disorders of memory loss. (4)
- (OR)**
- b) (i) What are the basic mechanisms associated with control of sleep? Explain in detail. (7)
- (ii) Elaborate the any ONE disorder of nervous system focusing on their pathophysiology, clinical signs and symptoms and treatment. (7)

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