Register Number:……..

KUMARAGURU
college of technology
character is life

B.TECH DEGREE EXAMINATIONS: MAY 2017

(Regulation 2014)

Sixth Semester

BIOTECHNOLOGY

U14BTE106 : Neurobiology and Cognitive Sciences

COURSE OUTCOMES

CO1: Outline the basis of central and peripheral nervous system and describe the structure of neurons and supporting cells

CO2: Explain the mechanism of action potential conduction and working of voltage dependent channels

CO3: Illustrate the concept of synaptic transmission and mechanism of action of neurotransmitters

CO4: Explain the basic mechanisms of sensations with special emphasis on skeletal muscle contraction.

CO5: Enumerate the mechanisms associated with motivation and describe the disorders associated with nervous system

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

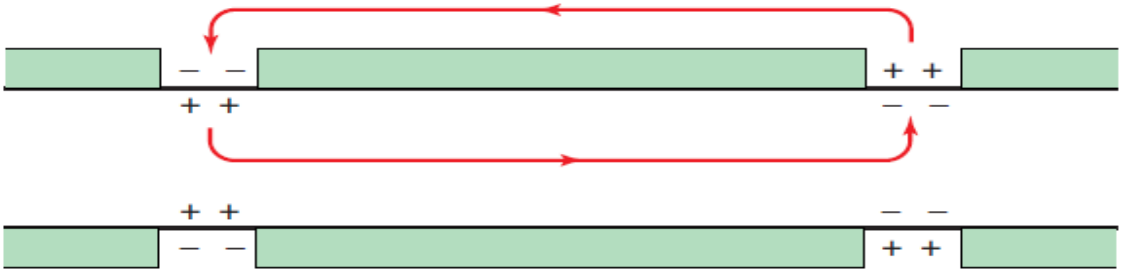
PART A (10 x 1 = 10 Marks)

1. Matching type item with multiple choice code CO3 [K_2]

List I	List II
A. Alcoholic base	i. GABA
B. Peptide	ii. Nitric oxide
C. Amino acid	iii. Acetyl choline
D. Gas	iv. Endorphin

	A	B	C	D
a)	ii	i	iii	iv
b)	iii	iv	i	ii
c)	ii	iv	iii	i
d)	iii	i	ii	iv

2. The given below diagram represents the fastest conduction of nerve impulse and it is due to CO1 [K_2]



a) High concentration of lipid and protein

b) Low concentration of lipid and high concentration of protein

c) High concentration of glycoprotein and low concentration of glycolipid

d) High concentration of lipid only

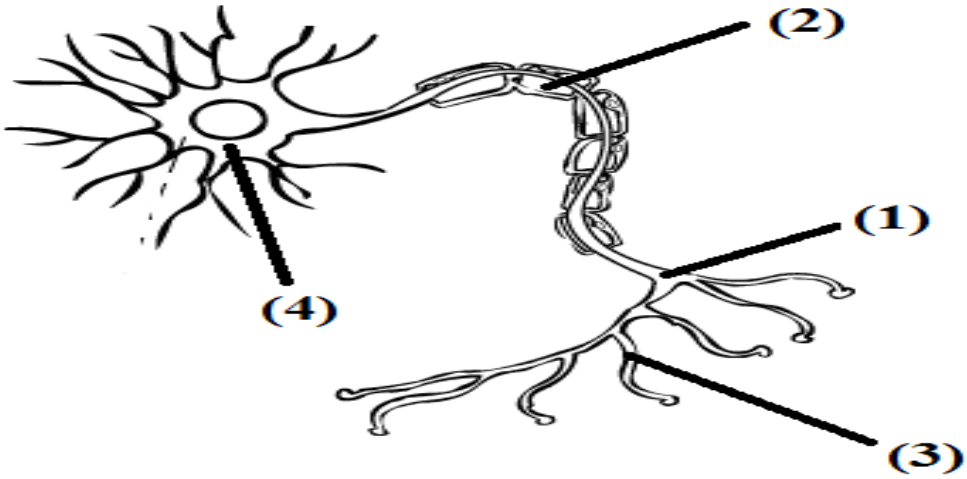
3. Select the correct given below statements connected with significance of membrane potential in a neuron. CO2 [K_4]

1. Goldman-Hodgkin-Katz equation can calculate the membrane potential with the aid of two univalent cations and anions, respectively
2. Concentrations (*C*) of the respective ions on the inside (*i*) and outside (*o*) of the membrane plays a significant role in the development of action (or) resting potential
3. Action potential obey the "All or None" law
4. In voltage gated Na^+ channel, the subunit 3 (S3) acts as voltage sensor

a) 2,3 b) 1,4

c) 1,2 d) 1,3

4. Observe and identify the location of Nissl bodies in a neuron CO1 [K_1]



a) 2 b) 4

c) 1 d) 3

5. **Assertion (A):** Phosphorylation of Ca^{2+} channel in a neural membrane can increase the efflux of calcium ions CO3 [K_4]

Reason (R): Calcium ions can stimulate synaptotagmin and synapsin for an indirect establishment of action potential

a) Both A and R are Individually true and R is the correct explanation of A

b) Both A and R are Individually true but R is not the correct explanation of A

c) A is true but R is false

d) A is false but R is true

6. The pathophysiology of epilepsy is mainly due to ---------- CO5 [K_3]

a) Increased activity of glutamate decarboxylase
b) Increased activity of GABA
c) Increased activity of glutamate
d) Increased Cl^- currents

7. Select the correct order of establishment of action potential and thereby, neurotransmitter release by a presynaptic neuron: CO2 [K_3]

1. Maintenance of -70 mV; 2. V-SNARE and T-SNARE interaction 3. Influx of Ca^{2+} ions; 4. Maintenance of -5 mV

a) 2-3-4-1
b) 1-3-2-4
c) 1-4-3-2
d) 4-1-3-2

8. High sour concentration can inhibit ---------- channel CO4 [K_2]

a) Ca^{2+}
b) K^+
c) Na^+
d) Cl^-

9. **Assertion (A):** The olfactory receptor cell (ORC) is a neuron and possess minute cilium that contain odorant receptor CO4 [K_4]

Reason (R): The odorant receptor adopt metabotrophic process with cAMP as second messenger

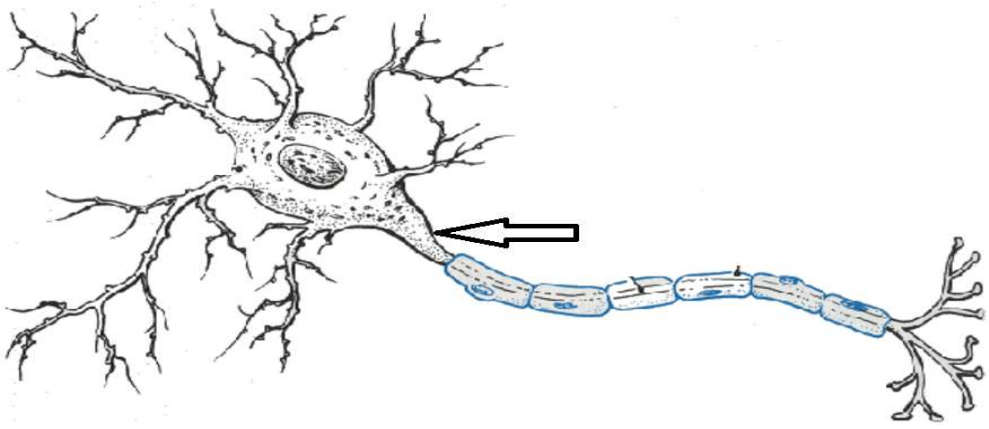
a) Both A and R are Individually true and R is the correct explanation of A
b) Both A and R are Individually true but R is not the correct explanation of A
c) A is true but R is false
d) A is false but R is true

10. Degeneration of substantia nigra (SN) neurons (produce dopamine) in brain primarily leads to ---------- CO5 [K_2]

a) Epilepsy
b) Depression
c) Parkinson disease
d) Myasthenia gravis

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

11. Observe the given below diagram and write the significance of the (arrow mark) indicated part CO1 [K_3]

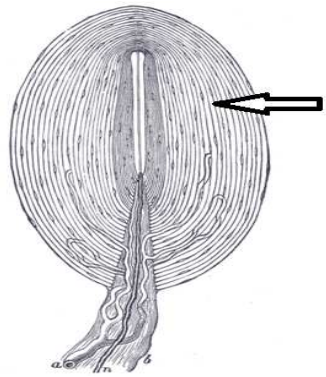


12. Give the significance of sensory neurons CO1 [K_2]

13. Assume that there is a decrease in the efflux of potassium ions from a neuron through appropriate channel. In this case, what membrane potential (approximate) will be recorded? Also draw the potential graph CO2 [K_4]

14. What is “All or None” principle? CO2 [K_2]

15.	After a strenuous physical exercise, you can observe an intense yellow color in voided urine and this is due to the less excretion of water (increased reabsorption of water is noticed in renal tubular cells). Under this context, give your comments about the role of nervous system	CO3	[K_5]
16.	Whether agrin is a guidance cue molecule? Substantiate your answer with proper reason	CO3	[K_3]
17.	The given below diagram depicts pacinian corpuscle. Write the importance of the indicated part	CO4	[K_3]



18.	Define nociception	CO4	[K_2]
19.	List the symptoms of agrophobia	CO5	[K_2]
20.	What is schizophrenia?	CO5	[K_2]

Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 300 words)

Q.No. 21 is Compulsory

21.	Analysis (1): The concentration of K_i^+ is 48 mM and K_o^+ is 129 mM Analysis (2): The concentration of K_i^+ is 106 mM and K_o^+ is 10.2 mM Calculate the neural membrane potential for the above cited analyses by applying Nernst equation and also draw the potential graph for both the conditions. Explain the appropriate mechanism processed in the **Analysis (2)**	(4+10)	CO2	[K_5]
22.	Assume an *in vivo* system is subjected towards fasting and it has to stimulate gluconeogenesis process. Under this condition, what type of primary stress hormone is synthesized and correlate the role of nervous system with apt regulatory mechanism		CO3	[K_4]
23.	Classify the nervous system and add a brief note on its functions		CO1	[K_2]
24.	Assume that you have consumed a salty food in excess. Explain the mechanism of detection of excess salt by your system		CO4	[K_3]
25.	Give a detailed account on the neuropathophysiology and symptoms of Parkinson's disease.		CO5	[K_2]
26.	Describe the mechanism of action of acetyl choline with apt steps.		CO3	[K_3]
27.	Elaborate the neural mechanism of the process of vision.		CO4	[K_2]

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