2020
PHYSIOLOGY
Course : 102
(Cellular Physiology, Molecular Physiology & Nanophysiology)

Full Marks : 40 Time : $2\frac{1}{2}$ Hours

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer any **two** questions: 20×2=40

1. a) Is EPSP a post-synaptic response? If so, why?

   b) What is EPP? Describe the electrophysiological basis for the genesis of EPP. "EPP is generated at the end-plate region of the muscle" – prove experimentally.

   c) MEPP could be recorded from the end-plate region of the muscle at rest. Explain with electrophysiological evidences.

   4+(2+4+6)+4=20

2. a) What is molecular docking? State the molecular mechanism of the docking of synaptic vesicle. What happens when tetanus toxin or botulinum toxin intoxicates a human individual?

   b) What do you mean by sensitization of cutaneous receptors? Could you explain schematically the cellular mechanism involved in cutaneous responses of axon reflex?

   c) Define spatial summation with tracings.

   (2+6+2)+(2+6)+2=20

3. a) Discuss the events that lead to necrosis of a cell. What is the role of mitochondria in mediating the apoptotic signal? Briefly discuss about caspases.

   b) How do cyclin dependant kinases (Cdks) partner with distinct cyclins to trigger different events of cell cycle?

   (6+6+4)+4=20

4. a) Explain how action of the cholera toxin in intestine is expressed due to altered G-protein activity.

   b) How does signal transduction takes place from EGF bound EGF receptor to activation of Ras protein?

   c) How does calcium bound calmodulin activate CaM kinase I? 8+8+4=20

5. Answer the following questions: 2×10=20

a) What is the utility of Ramachandran Plot?

b) What is the H-bonding pattern in beta strand?

c) What is the difference between B and A DNA?

d) What is alpha helix?

e) What is iso-electric pH?

f) Mention the different types of non-covalent forces present in a protein?

g) What is the principle of chromatography?

h) What are the factors responsible for DNA melting?

i) What are the functions of a helix-turn-helix motif?

j) Distinguish between different types of helical structures of a protein.

6. a) Give examples of enzymes which contain selenocysteine, the 21st amino acid, at the active site. Name the codon which can incorporate this special amino acid into the protein. What is Keshan disease?

b) What are the components of eIF-4F complex? Illustrate the eIF-4F. Cap mRNA complex formation in the initiation phase of protein synthesis.

c) What are snRNAs? Discuss their role in the removal of introns and splicing of exons in the nucleus. Name an autoimmune disease related to snRNA.

(2+1+2)+5+(2+7+1)=20

7. a) What are the functions of cell membranes? How are lipids packed into cell membranes?

b) Describe the structure of the plasma membrane with suitable diagram. How does lipid composition affect the physical properties of membranes?

c) How do proteins interact with membranes? How are membrane proteins solubilized?

d) What is the importance of lipid rafts in membrane physiology and structure?

(2+3)+(3+2)+(3+2)+(3+2)=20

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Submit your answer in PDF file to:
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