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63/2 (SEM-1) ZOO 102

2021

(held in 2022)

**ZOOLOGY**

(Theory Paper)

Paper Code : ZOO-102

**(Molecular Cell And Receptor Biology)**

Full Marks – 80

Time – Three hours

The figures in the margin indicate full marks  
for the questions.

1. Answer the following multiple choice questions  
(all compulsory) : 1×6=6

(a) The nature of the ligand that binds to the  
extracellular receptor which acts as transcrip-  
tion regulators are

(i) Small hydrophilic molecules

(ii) Small hydrophobic molecules

(iii) Large hydrophilic molecules

(iv) Large hydrophobic molecules

[Turn over

- (b) The toll-like receptor contribute to
- (i) Innate immunity
  - (ii) Adaptive immunity
  - (iii) Both (i) and (ii)
  - (iv) None of the above
- (c) The binding affinity of the KDEL receptor is very sensitive to
- (i) Temperature
  - (ii) Vesicle coat
  - (iii) pH
  - (iv) SNAREs
- (d) Which phospholipid is the most common in cell membranes ?
- (i) Phosphatidylcholine
  - (ii) Phosphatidylserine
  - (iii) Phosphatidylethanolamine
  - (iv) Sphingomyelin
- (e) All of the following are true to the nuclear pore complex (NPC), except
- (i) NPC is a quaternary protein structure
  - (ii) NPC is a 8-fold symmetry structure

- (iii) NPC is a diameter of 120 nm
  - (iv) Cytoplasmic fibrils form nuclear basket structure in NPC.
- (f) Choose the incorrect statement from the following :
- (i) Bacterial genome does not contain introns
  - (ii) Bacterial genome does not contain non-coding genes
  - (iii) Bacterial genome has a single origin of replication
  - (iv) Bacterial genome are arranged in a polycistronic manner.

2. Answer the following questions (*all compulsory*) :  
2×5=10

- (a) What are the second messenger and its benefit on cell signaling ?
- (b) What do you mean by primary and secondary active transport ?
- (c) What is an operon ?
- (d) Define osmosis and different tonic solution which affect osmosis.
- (e) Which factors decreases the flexibility of a plasma membrane ?

3. Answer any *six* of the following questions :

5×6=30

- (a) Toll-like Receptors (TLRS) are stimulated by what type of molecules and what is their function ?
- (b) Elucidate the Erk signaling pathway with a suitable diagram.
- (c) Write about the effects of temporal and spatial summation in synaptic potential at a neuron.
- (d) What are the structural and functional differences present between the V-class and F-class proton pumps ?
- (e) How double pass trans-membrane protein is synthesized and integrated into the ER membrane ?
- (f) Write about the protein transport through the nuclear pore.
- (g) How does GPCR increases cytosolic  $Ca^{2+}$  and activate PKC ?
- (h) Describe how do you use cells as an experimental model.
- (i) Describe the role of the KDEL receptor in the retrieval of ER-resident protein from Golgi.

4. Answer any *two* of the following long type questions :

10×2=20

- (a) Illustrate how does the transport vesicle selects the appropriate molecules that need to be transported excluding others ? How these molecules are delivered to the appropriate destinations ? 5+5=10
- (b) Describe the origin of prokaryotic cells during primitive earth. Add note on the evolution of eukaryotes from prokaryotes. 5+5=10
- (c) Describe the structures and replication mechanisms of different types of viruses. 4+6=10

5. Answer any *one* of the following very long type questions :

14×1=14

- (a) What do you mean by Ras-GEFs and Ras-GAPs ? Illustrate how photosensitive R8 cell helps in the differentiation of R7 cell in the eye *Drosophila*. 4+10=14
- (b) Describe the structure of Nuclear Pore Complex (NPC) using suitable diagram. How NPC disassembly takes place ? 8+6=14