



Department of Biosciences and Bioengineering
Indian Institute of Technology Guwahati
Guwahati 781039 Assam, India

Course: BT-605 (MIDSEM)
Total marks-30

Date: 17/09/2024
Total time: 120 mins

Q1. Fill in the blanks (2.5 marks)

- a) Euchromatin differs from heterochromatin in _____ and _____ of histones.
- b) _____ and _____ are the types of lymphocytic mitogens.
- c) _____ and _____ are the markers for stem cells and a dendritic cells, respectively.
- d) Actinomycin D inhibits _____ while penicillin inhibits _____.
- e) Copy choice phenomenon is seen in _____ because it has _____ genome.

Q2. Analogy questions (2.5 marks)

- | | | |
|--------------------------------|---------------|--------------------------|
| a) Certolizumab : TNF α | is similar as | Anakirna : _____ |
| b) Antibodies : B cells | is similar as | _____ : T cells |
| c) P5 : Rep | is similar as | _____ : Cap |
| d) Neutrophils : Cholera | is similar as | _____ : Leishmaniasis |
| e) Maize : Barbara McClintock | is similar as | _____ : Beadle and Tatum |

Q3. Very short answer questions (Maximum 2-3 sentences) (15 marks)

- a) Why small amount of alcohol is used during transformation?
- b) How chaperones are linked with Parkinson's disease?
- c) Why heat treatment is done while purifying the adeno-associated virus?
- d) Why it is difficult to infect liver cells with lentivirus?
- e) What was the reason for the patient's death in the first gene therapy trial?
- f) Why linearized plasmid can show good expression of cloned gene as compared to the circular plasmid?
- g) How different stages of clinical trial are divided?
- h) What is the principle of ADAR based technology?
- i) Why are the E1 and E3 genes of adenovirus problematic?
- j) How can SV40 infection cause the immortalization of a cell and also loss of cell-mediated immune response?
- k) What is Trastuzumab? How it is different from Trastuximab. Which one will be more immunogenic to humans and why?
- l) Why taking more eggs some time could cause deficiency of vitamin B7?
- m) What could be the role of Golgi in the protein modification?
- n) Assume that each base A, T, G or C occurs with equal frequency in the DNA. How many cut a *NotI* enzyme will do to a dsDNA of length 70,000 bp.
- o) How could you justify *ONE GENE MULTI-PROTEIN* hypothesis in a viral genome?

Q4. What are the hurdles of targeting the RNA into the cytoplasm of neurons? How do you bypass it, explain anyone methods with an example. (2.5 marks)

Q5. Explain the advantages of using Alphavirus as a vector for gene therapy over AAV. Discuss the manufacturing of a gutless Alphavirus vector for the treatment of β -thalassemia with a diagram. (2.5 marks)

Q6. What do you mean by Ad-hybrid system? What are the advantages of using it for gene therapy? (2.5 marks)

Q7. Draw a diagram of a retrovirus and design an experiment to show that the gp120 binds to CD4 receptor. (2.5 marks)