

**BIOPHARMACEUTICALS**  
**(BIOT 6132)**

**Time Allotted : 2½ hrs**

**Full Marks : 60**

*Figures out of the right margin indicate full marks.*

*Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.*

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

**Group – A**

1. Answer any twelve:

**12 × 1 = 12**

*Choose the correct alternative for the following*

- (i) Which of the following is the pharmacodynamics method of studying bioavailability?  
(a) Stool excretion studies (b) Urinary excretion studies  
(c) Plasma-level time studies (d) None of the above.
- (ii) Which of the factors will affect solubility of drugs?  
(a) Polarity (b) Molecular Size  
(c) pH (d) All of the above.
- (iii) First pass metabolism occurs in  
(a) Liver (b) Kidneys  
(c) Pancreas (d) Intestines.
- (iv) Cachectin is another name of  
(a) TNF-alpha (b) TNF-beta  
(c) Interleukin (d) None of these.
- (v) Bacterial lipopolysaccharide is inducer of  
(a) TNF-alpha (b) Monokines  
(c) Interleukin (d) None of these.
- (vi) IL-4 is produced by  
(a) Bcells (b) Macrophages  
(c) NK cells (d) All of these.
- (vii) The gene for IFN alpha is located in human chromosome  
(a) Nine (b) Thirteen  
(c) Twelve (d) Seven.
- (viii) Hemophilia A is due to deficiency of clotting of  
(a) Platelets (b) T lymphocytes  
(c) Macrophages (d) Monocytes.

- (ix) Which of the following type of vaccines did the Moderna and Pfizer-BioNTech companies design for COVID-19?  
 (a) mRNA vaccine (b) Subunit vaccine  
 (c) Toxoid vaccine (d) Vector-borne vaccine.
- (x) The hybridomas are made by  
 (a) Fusing T cells with myeloma cells  
 (b) Fusing B cells with myeloma cells  
 (c) Fusing T helper cells with myeloma cells  
 (d) Fusing B memory cells with myeloma cells.

*Fill in the blanks with the correct word*

- (xi) The essential tools in pharmacokinetics is \_\_\_\_\_.
- (xii) Clinical Trial consists of \_\_\_\_\_ phases.
- (xiii) The factor responsible for wound healing is \_\_\_\_\_.
- (xiv) Cystic Fibrosis therapy uses \_\_\_\_\_ as biopharmaceutical.
- (xv) Lactose intolerance disease is prevented in presence of \_\_\_\_\_.

### **Group - B**

2. (a) Draw a flow chart showing generic drug review process. [[CO1](Analyse/IOCQ)]  
 (b) Define Bioequivalence. What is the purpose of Bioequivalence? [[CO1](Understand/LOCQ)]  
 (c) What is first pass effect? A drug given intravenously or orally. Which method is better for absorption purposes? [[CO1](Apply/IOCQ)]  
**4 + 4 + 4 = 12**
3. (a) Give a detailed comparison of competitive and non-competitive antagonists. [[CO1](Analyse/IOCQ)]  
 (b) Explain with the help of a diagram the Threshold, ED50 and Ceiling of a drug. [[CO1](Understanding/LOCQ)]  
 (c) Analyse how the process of entrapment or encapsulation technique is done. [[CO1](Analyse/IOCQ)]  
**4 + 4 + 4 = 12**

### **Group - C**

4. (a) Illustrate the mode of action of any growth hormone that act as cytokine. [[CO3](Analyse/HOCQ)]  
 (b) Analyse the characteristics of interferon receptors. [[CO4](Remember/LOCQ)]  
**6 + 6 = 12**
5. (a) Distinguish chemokine and interleukin. [[CO3](Analyse/HOCQ)]  
 (b) Write down the classification of receptors. [[CO2](Remember/LOCQ)]  
**6 + 6 = 12**

## Group - D

6. (a) Design a therapeutic antibody using an antibody engineering technique. [[CO4](Design/HOCQ)]  
(b) What do you mean by Conjugated Peptide Vaccine? [[CO3,5](Understand/LOCQ)]  
(c) Elucidate the term 'Peptide Nuclei Acids' and comment on their applications as biopharmaceuticals. [[CO4](Analyse/IOCQ)]  
**4 + 4 + 4 = 12**
7. (a) Differentiate between Pleuripotent, Totipotent and Multipotent stem cells. [[CO4](Differentiate/IOCQ)]  
(b) Discuss on the role of stem cells in cancer therapy. [[CO4](Understand/LOCQ)]  
(c) How did the researchers design a therapeutic strategy to treat a person suffering from Parkinson's disease? [[CO4](Criticize/HOCQ)]  
**4 + 4 + 4 = 12**

## Group - E

8. (a) Illustrate how cystic fibrosis disease is prevented? [[CO3](Analyse/HOCQ)]  
(b) Analyse plate plug formation method. [[CO4](Remember/LOCQ)]  
**6 + 6 = 12**
9. (a) Illustrate the mode of action of lactase and asparaginase. [[CO3](Analyse/HOCQ)]  
(b) Discuss different diseases related to disorder of blood clotting. [[CO4](Remember/LOCQ)]  
**6 + 6 = 12**

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Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	41.67	25	33.33

### Course Outcome (CO):

After the completion of the course students will be able to

- 1) Understand the concept behind drug discovery and development along with their Pharmacokinetics and Pharmacodynamics knowledge.
- 2) Analyze the course of actions of various cytokines and their applications in therapeutics.
- 3) Describe the uses of various types of vaccines
- 4) Understand and analyze the uses of various kinds of enzymes for their therapeutic values
- 5) Explain the usage of interleukins and growth factors as biopharmaceuticals.
- 6) Apply the rationale behind use of peptide vaccines and its application against infectious diseases.

\*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question.

