

Biopharmaceuticals
(BIOT 6153)

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

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

Group - A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following: 10 x 1=10
- (i) Organisms suitable for use in modified live vaccines are produced by
(a) inactivation (b) genetic recombination
(c) attenuation (d) complement fixation.
- (ii) A suitable organism for use in recombinant vaccines is
(a) influenza virus (b) smallpox virus
(b) poliomyelitis virus (d) vaccinia virus.
- (iii) One problem why vaccines fail to work in very young infants is the presence of
(a) maternal antibodies (b) glycoproteins
(b) endotoxin (d) serum.
- (iv) IL-10 acts to
(a) enhance T-cell response (b) activate macrophages
(c) suppress cytokine production (d) suppress antibody production.
- (v) Hemophilia A is due to deficiency of clotting factor :
(a) X (b) XIII (c) XIII (d) V.
- (vi) In JAK-STAT pathway phosphorylation occurs at
(a) Tyrosine residue (b) Alanine residue
(c) Tryptophan residue (d) None of these.
- (vii) DNase is used to control:
(a) Cystic fibrosis (b) Gaout,
(c) Cancer (d) none.
- (viii) Cytokine receptor is composed of
(a) two separate subunit (b) one subunit
(c) both a and b (d) none of these.

- x) Urate oxidase is used to control
 (a) milk intolerance (b) cystic fibrosis
 (c) gout (d) None of these.
- κ) In JAK-STAT pathway phosphorylation occurs at
 (a) tyrosine residue (b) alanine residue
 (c) tryptophan residue (d) none of these.

Group - B

- a) Discuss about the oral and pulmonary route for delivery of biopharmaceuticals.
- b) What are the roles of Bioavailability and Bioequivalence studies during drug testing?
 $[3 + 3] + [3 + 3] = 12$
- (a) What are the principles behind rational drug design?
- (b) Comment on the impact of genomics on drug discovery.
- (c) Describe the different aspects of phase-I, phase-II and phase-III clinical trials for drug testing.
 $4 + 4 + 4 = 12$

Group - C

- a) Define cytokine. Give two examples.
 $(2 + 1) + 9 = 12$
- b) Schematically describe JAK-STAT pathway.
- a) What are different types of interferons? Write down the specific mode of action of interferon.
 $(2 + 5) + 5 = 12$
- b) Write notes on cytokine receptor.

Group - D

- a) What are polyclonal antibodies?
- b) Discuss the role of anti-D immunoglobulins in human therapeutics.
- (c) How are snake and spider antivenoms used as therapeutic agents?
 $2 + 5 + 5 = 12$

- 7.(a) Mention the uses of HepatitisB and Tetenus immunoglobulins as biopharmaceuticals.
- (b) How can you design a cancer vaccine?
- (c) Discuss the benefits of bone marrow stem cells in human therapeutics.
 $4 + 4 + 4 = 12$

Group - E

- 8.(a) What is CHO cell line?
- (b) Why it is preferred host for cloning mammalian protein pharmaceuticals?
- (c) Write down different steps for expressing human protein gene in CHO cell line?
 $2 + 3 + 7 = 12$
9. Write short notes on (*any three*):
- i) Human blood substitute
 - ii) Hematopoeitic stem cell
 - iii) Alpha galactosidase as pharmaceuticals
 - iv) Erythropoietin
 - v) Platelet function in blood clotting

$(3 \times 4) = 12$