BIOPHARMACEUTICALS (BIOT 6132)

Time Allotted : 3 hrs

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 alternative for the following: $10 \times 1 = 10$ (i) How many phases of clinical trials exist to approve a drug? (a) 2 (c) 1 (d) 3. (b) 4 Which of the following is the pharmacodynamics method of studying bioavailability? (ii) (a) Stool excretion studies (b) Urinary excretion studies
 - (c) Plasma-level time studies (d) None of the above.
 - (iii) The essential tools in pharmacokinetics is (b) permeability (a) solubility (c) bioavailability (d) all of the above.
 - (iv) Which of the following type of vaccines did the Moderna and Pfizer-BioNTech companies design for COVID-19? (a) mRNA vaccine (b) Subunit vaccine (d) Vector-borne vaccine.
 - (c) Toxoid vaccine
 - (v) Which of the following statement is incorrect about the Live attenuated vaccine?
 - (a) It is prepared using whole weakened living bacteria or virus
 - (b) It can generate a long-term immune response with the administration of a single dose
 - (c) Measles, MMR, and oral polio vaccine are live attenuated vaccines
 - (d) It is stable at normal room temperature.
 - (vi) Which of the following is INCORRECT about HAT medium? (a) Hat medium is a selective medium

Full Marks: 70

(b) Aminopterin in the HAT medium blocks de novo pathway of nucleotide synthesis (c) Salvage pathway requires aminopterin and thymidine (d) Hypoxanthine is converted to Guanine by HGPRT enzyme.

(vii) In JAK-STAT pathway phosphorylation occurs at (a) Tyrosine residue (b) Tryptophan residue (c) Alanine residue (d) Clarification of fruit juice.

(viii) The factor responsible for wound healing is (c) PDGF (a) TNF (b) FGF (d) IL-7.

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(ix) Cystic Fibrosis therapy uses

(a) Dnase
(b) Glucose oxidase
(c) Lactase
(d) Protease.

(x) Milk intolerance therapy uses

(a) Amylase
(b) Glucose oxidase
(c) Lactase
(d) Protease.

Group-B

- 2. (a) Explain the concept of spare receptors. [(CO1)(Remember/LOCQ)]
 (b) With the help of a graph analyse the concepts of potency, efficacy and Therapeutic Index. [(CO1)(Analyse/IOCQ)]
 (c) Distinguish between first and zero order elimination rates of a drug. Which one is more potent? [(CO1)(Analyze/IOCQ)]
 4 + 4 + 4 = 12
- 3. (a) What is meant by the phenomenon First Pass Metabolism? Analyse with an appropriate graph how bioavailability can be determined. [(CO1) (Analyse/IOCQ)]
 - (b) What are the advantages and disadvantages of I.V routes of drug administration?

[(CO1) (Understand/LOCQ)] [(CO1)(Analyse/IOCQ)]

(c) Discuss briefly how are drugs terminated.

Group - C

- 4. (a) Discuss how cytokine participate in signal transduction pathway.
 - (b) Write notes on tumor necrosis factor.
 - (c) What is the importance of nutrophic factor?

[(CO3)(Remember/LOCQ)][(CO2)(Analyze/LOCQ)][(CO3)(Analyze/IOCQ)]4 + 4 + 4 = 12

4 + 4 + 4 = 12

- 5. (a) Explain synergy and redundancy properties of cytokine with example.
 - (b) Distinguish chemokine and interleukin.
 - (c) Write the effect of interferon on cancer cell.

[(CO3)(Remember/LOCQ)][(CO1)(Analyze/LOCQ)][(CO3)(Analyze/IOCQ)]5 + 5 + 2 = 12

Group - D

- 6. (a) How can you design a cancer vaccine? [(CO2)(Design/HOCQ)]
 (b) What do you mean by a subunit vaccine? Discuss the advantages of a subunit vaccine. [(CO3,5)(Understand/LOCQ)]
 (c) Analyze with reasons how MAbs can be produced *in vitro* by hybridoma technique. [(CO4)(Analyze/IOCQ)]
 (c) 4 + (2 + 2) + 4 = 12
- 7. (a) Discuss the importance of cord blood cells in therapeutics and research.[(CO4)(Analyze/IOCQ)]

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- How are anti-D immunoglobulins used as biopharmaceuticals? (b)
- [(CO4)(Understand/LOCQ)] Critically discuss the role of snake and spider antivenins in polyclonal antibody (C) [(CO4)(Criticize/HOCQ)] preparations.

4 + 4 + 4 = 12

Group - E

8. (a) Write the mode of action of platelet in blood coagulation process.

What are anticoagulants? Write their mode of action. (b)

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[(CO4)(Remember/LOCQ)]
[(CO3)(Understand/LOCQ)]
                6 + 6 = 12
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- Write notes on Beta galactosidase as pharmaceutical. 9. (a)
 - What is G-CSF? (b)

- [(CO1)(Remember/LOCQ)] [(CO2)(Understand/LOCQ)]
- What are platelets and write their functional charecteristics. [(CO2)(Analyse/IOCQ)] (C)

4 + 4 + 4 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	56.25	35.41	8.33

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

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

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