Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech(BT)/SEP. SUPPLE/SEM-7/BT-701/2012

2012

ANIMAL CELL & CULTURE AND MOLECULAR MODELING

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

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

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : 10 × 1 = 10

i) Harrison used cold blooded animal tissue for his first attempt towards cell culture due to

a) low incubation temperature

b) serum free culture conditions

c) easy availability

d) inexpensiveness.

ii) Which one of cell adhesion mechanism is calcium dependent ?

a) CAM

b) Cadherin

c) Integrin

d) Transmembrane glycoprotein.

iii) Which one of the following component is more stable and can serve to be a potential substitute for glutamine in cell culture media following autoclaving and long term media storage ?

a) Glycylglutamine b) Valine

c) Proline d) Glutamate.

iv) Prions can be removed from cell culture media by using virus filters having pore size of

a) 0·1 μm b) 0·4 μm

c) 0·2 μm d) 15 nm.

v) For insect cell culture one of the popular basal media is

a) BME b) IMDM

c) TC199 d) Schneider's medium.

vi) One example of balanced salt solution which can maintain the desired pH when equilibrated with air

a) EBSS b) HBSS

c) ESSS d) PBS.

vii) Selection of cell fusion hybrid cells after a (rodent × human) fusion can be achieved by

a) HGPRT b) TK

c) PEG d) Ouabain.

viii) Which of the following is true about secondary structure prediction ?

a) Chow-Fasman b) PAM

c) BLOSUM d) PSSM.

ix) To predict 3D structure from sequence in the absence of homology is

a) Homology modeling

b) Ab-initio structure modeling

c) Threading

d) Model verification.

x) QSAR stands for

a) Quality Structure Activity Relationship

b) Quality Structure Accessory Relationship

c) Quantitative Secondary Activity Relationship

d) Quantitative Structure Activity Relationship.

xi) Which of the following database can be used to access protein domain information ?

a) Prosite

b) DDBJ

c) Sanger

d) Kegg.

xii) Databases such as CATH and SCOP are used to identify

a) the structural family to which a protein belongs

b) the genic family to which a protein belongs

c) homologous proteins

d) analogous proteins.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. How one can grow cells in glass bead bed bioreactor ?

3. What are the advantages of porous carries compared to solid carriers ?

4. Write short notes on the following : 3 + 2

   a) Mycoplasma

   b) Lipofection.

5. Describe Linear Free Energy Relationship developed by Hammett.

6. What are the three main components of tissue engineering ?

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) In a conformational energy calculation, what are the two types of interaction between molecules ?

   b) How are conformational coordinates of a protein specified ?

   c) Write out the quantitative expressions for 6 terms that are used in the evaluation of the energy of a specific protein conformation.

   d) What role do solvent interactions play in protein structure stabilization ? How is the solvent modelled in molecular modelling ? 3 + 3 + 5 + 4

8. a) What are the different types of methods used for disaggregation fo animal tissue or orgin fragment ? What are different enzymes used for disaggregation of animal tissue or organ fragment ?

   b) Describe briefly the procedure involved in warm and cold trypsinisation for the preparation of primary culture from animal tissue or organ fragment.

   c) Write three important advantages of cold trypsinisation. 5 + 7 + 3

9. a) How animal cells are stored in the laboratory ?

   b) Discuss the method for thawing and recovering animal cells from a frozen sample.

   c) How you can determine the viability and cell number using hemocytometer and trypan blue staining ?

   4 + 5 + 6

10. Some animal cells are immobilized in a microcarrier beads of sephadex of 8 mm diameter with cells loading of 0.018 kg/m^3. 100 such cells are introduced in a 1.5 *l* CSTR stirred at 20 rpm. The kinetics of the system can be approximated as first order of 3.11×10^5 sec^{-1} per kg cell mass :

    a) What is the feed rate of substrate (So = 3.2×10^{-3} kg/m^3) for 80% conversion of the substrate ?

    b) If the diffusivity of substrate the beads is De = 2.1×10^{-9} m^2/s, what is the value of Thiele parameter, φ ? Comment on the intra particle diffusion effect in the system. 10 + 5

11. Can you use methylene blue instead of trypan blue for counting viable cells ? Why ? What is 'Colony Forming Efficiency' ? What steps would you take for the development of a new drug ? 1 + 3 + 2 + 9