



Name :

Roll No. :

Invigilator's Signature :

CS/B.Tech(BT)/SEM-7/BT-701/2010-11

2010-11

**ANIMAL CELL CULTURE &
MOLECULAR MODELLING**

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 : $10 \times 1 = 10$
 - i) Trypan blue dye-exclusion is based on the concept that
 - a) viable cells are permeable to the dye
 - b) only the mitochondria of the viable cells take up the dye
 - c) dead cells are permeable to the dye
 - d) none of these.
 - ii) Which of the following is used for disaggregation of tissue in animal cell culture ?
 - a) DNA polymerase
 - b) RNA polymerase
 - c) Trypsin
 - d) none of these.



- iii) The primary cell culture becomes a secondary culture only after
- a) 1st passage
 - b) 3rd passage
 - c) 5th passage
 - d) none of these.
- iv) Phenol red, commonly present in animal cell culture medium becomes
- a) yellow at pH = 6.5
 - b) red at pH = 7.4
 - c) both (a) & (b)
 - d) none of these.
- v) In animal cell culture medium serum provides
- a) various salts
 - b) hormones and growth factors
 - c) complex carbohydrates
 - d) most of the lipid compounds.
- vi) 1st human cell line was
- a) T2
 - b) U373
 - c) HeLa
 - d) WM39.
- vii) CATH includes which of the following ?
- a) Class, Fold, Superfamily
 - b) Class, Fold, Family
 - c) Class, Architecture, Topology
 - d) All of these.



- viii) σ in a QSAR relationship stands for
- resonance delocalization in an aromatic ring
 - partition coefficient between water and an organic solvent
 - electron withdrawing/donating capacity of substituent
 - hydrophobic interaction capacity.
- ix) SOPMA and GOR with the same database to compare to has improved prediction accuracy over the Chou Fasman method by about
- 70 per cent
 - 80 per cent
 - 10 per cent
 - 30 per cent.
- x) Threading is a method for
- Homology modelling
 - Fold recognition
 - Gene prediction
 - Ligand protein docking.
- xi) SWISS MODEL is the server that is used in
- homology modelling
 - comparative modelling
 - both (a) & (b)
 - none of these.
- xii) In a docking calculation, a 1 ligand to many protein interaction provides which one of the following information ?
- Prediction of specificity
 - Mode of binding
 - Estimation of affinity
 - Ranking of affinities.



GROUP – B

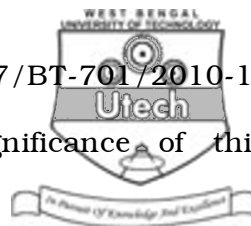
(Short Answer Type Questions)

Answer any *three* of the following.

3 × 5 = 15

2. Match the scientists with their contribution for development of animal cell culture :

Column A	Column B
Temin and Rubin (1958)	Showed that cells can grow for long periods in culture provided they are fed regularly under aseptic conditions.
Harrison (1907)	Showed that human fibroblasts die after a finite number of divisions in culture.
Gey et al (1952)	Developed a quantitative assay for the infection of chick cells in culture by purified Rous sarcoma virus.
Carrel (1913)	Cultivated amphibian spinal cord in a lymph clot, thereby demonstrating that axons are produced as extensions of single nerve cells.
Hayflic and Moorhead (1961)	Established continuous cell lines derived from a human cervical carcinoma.



3. What is PHD ? Write down the significance of this programme.
4. Define and differentiate the following terms :
 - a) Identity
 - b) Similarity
 - c) Homology.
5.
 - a) State what are the advantages the cultured mammalian cells have that make them more attractive over the prokaryotic cells for the production of vaccines, monoclonal antibody and many other recombinant DNA products.
 - b) Give a comparative profile of the characteristics of a normal cell strain and an oncogenically transformed cell line.
6. How you clone a transfected cell line ?

2 + 3

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. What is Molecular dynamics simulation ? What is the difference between molecular dynamics simulation and Monte Carlo simulation ? Write down the interaction energy and their potential function involved in the molecule. How do you get the dynamic trajectory of the molecule from the potential function ?

2 + 3 + 5 + 5



8. How are the secondary structures of the protein predicted by Chou Fasman ? What is docking ? Write the steps used in docking (any one docking programme). 8 + 2 + 5
9. a) What is primary culture of animal cells ? 1
- b) How do you separate and culture mononuclear cells from human peripheral blood ? 3
- c) Write short notes on the following : 2 + 2 + 3
- i) Explant culture
- ii) Conditioned medium
- iii) Feeder cells.
- d) What are the widely used methods for cell fusion technique ? Briefly explain the method for selection of hybrids by complementation of conditional mutants. 1 + 3
10. a) What are the different types of methods used for disaggregation of animal tissue for organ fragment ? Name different enzymes used for disaggregation of animal tissue or organ fragment. 3 + 3
- b) Briefly explain the procedure involved in warm and cold trypsinisation for the preparation of primary culture. 6
- c) Write down the advantages of cold trypsinisation. 3



11. a) Distinguish between stable and transient transfections. Discuss the Calcium phosphate DNA co-precipitation method of DNA transfection. Why is Strontium phosphate favoured over Calcium phosphate in DNA co-precipitation method in some cases ? 2 + 3 + 1
- b) State the important points to have mycoplasma-free cell lines. What are the techniques involved in mycoplasma detection ? How to have a Prion free cell culture ? 3 + 3 + 3
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