KATHMANDU UNIVERSITY
End Semester Examination
March/April, 2017

Marks Scored:

Level : B.Tech.
Year : III

Course : BIOT 301
Semester: I

Exam Roll No. :

Time : 30 mins.

F. M. : 20

Registration No. :

Date : APR 0 2 2017

SECTION "A"

[20 Q.×0.5=10 marks]

I. Choose and tick (√) the most appropriate answer.

1. Which of the following is false regarding Bio separation :
[ ] Products are present in very high concentration
[ ] Various impurities present in starting material
[ ] Stringent quality control is required
[ ] Susceptibility to denaturation

2. Stoke- Einstein radius increases with increase in
[ ] Temperature [ ] Diffusivity [ ] Viscosity [ ] Density

3. Which of the following macromolecules has the highest molecular weight?
[ ] Penicillin-G [ ] Lysozyme
[ ] Immunoglobulin G [ ] Plasmids

4. Lysozyme is useful for chemical disruption of
[ ] Gram positive bacteria [ ] Gram negative bacteria
[ ] Yeast [ ] Mold

5. For small scale recovery ofintracellular protein which method is best
[ ] Bead mill [ ] Rotor stator mill
[ ] French press [ ] Ultra sonication

6. Which of the following is used for downstream processing of enzymes
[ ] Ammoniumsulphate [ ] Acetone
[ ] Urea [ ] Guanidine hydrochloride

7. Centrifugation time for same rpm will be
[ ] more in fixed angled rotor than swing out rotor
[ ] Less in fixed angled rotor
[ ] equal in both rotors
[ ] depended on temperature

8. The area above the bimodal solubility curve in ternary phase diagram represents
[ ] Single phase region [ ] Multi phase region.
[ ] Solid liquid phase. [ ] Gas phase

9. The following are the disadvantages of adsorption except :
[ ] Low selectivity [ ] Solute binding restrictive to surface
[ ] Batch mode only [ ] Loss of biological activity

10. Reverse phase adsorption can be used for binding all the following compound except
[ ] Antibiotics [ ] Proteins [ ] Lipids [ ] Hormones

11. All are affinity ligands except
[ ] Antibodies [ ] Dye
[ ] C8 aliphatic chain [ ] Protein G

12. The isotherm that is applicable when the solute concentration is very low is
[ ] Langmuir isotherm [ ] Linear isotherm
[ ] Freundlich isotherm [ ] Nonlinear isotherm

13. Which of the following is essentially a non-equilibrium process?
[ ] Adsorption [ ] Chromatography
[ ] Extraction [ ] Precipitation

14. The value of resolution parameter that indicates overlap of two peak is
[ ] equal to one [ ] more than one
[ ] Less than one [ ] equal or less than one

15. Number of Theoretical plates of chromatography is estimated by
[ ] chromatogram plot [ ] Adsorption plot
[ ] van de meter plot [ ] isotherm plot

16. With vacuum filtration, maximum pressure drop is limited to
[ ] 0.5 atmospheric pressure [ ] 1 atmospheric pressure
[ ] 2 atmospheric pressure [ ] No limitation

17. When the cake is product of interest, which one of the following is avoided during filtration?
[ ] High pressure [ ] Use of filter aid
[ ] Feed pretreatment [ ] Depth filtration

18. What process iscommonly used for purification of proteins?
[ ] Nano filtration [ ] Dialysis
[ ] Ultrafiltration [ ] Microfiltration

19. Diffusivity is largely dependent on
[ ] Molecular weight [ ] Friction factor [ ] Viscosity [ ] pH

20. Salt induced precipitation governed by
[ ] Cohn equation [ ] Isotherms
[ ] Stoke Einstein equation [ ] Monad equation

SECTION "B"
[10 Q.×1=10]

Fill in the blanks.

21. One base pair is roughly equivalent to _____ kg/kg mole

22. Typical rotation speed for rotor stator mill is _____ rpm.

23. One Svedberg unit (S) is equal to _____ sedimentation coefficient(s).

24. Solvents like _____ are known to disrupt fungal cells.

25. Solvents such as acetone precipitates protein by decreasing the _____ of the solution.

26. Anion exchange adsorbent binds _____ charged molecules.

27. One example of preparative centrifuge is _____.

28. _____ binding is stereo specific recognition of target molecules by ligand.

29. _____is the ratio of moles of solute bound to stationary phase to moles of solute in mobile phase

30. Transport across _____membrane occur bypartition diffusion partition mechanism.

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SECTION "C"

Attempt *ANY FOUR* questions.

1. Predict the solubility of a protein having a molecular weight of 67,000 kg/kg-mole in water if its solubility values in 1.5 M and 2 Mammonium sulfate solutions are 18 g/l and 6 g/l respectively [7]

2. Explain the working principle of disc stack centrifuge with a diagram. [7]

3. Explain principle and application of precipitation by anti-chaotropic salts. [7]

4. Explain the batch extraction process with diagram. [7]

5. Explain the different types of adsorption isotherms with their application. [7]

SECTION "D"

Attempt *ALL* questions.

6. Precipitated alpha-amylase suspension having sedimentation coefficient of 4.5 were centrifuged using 5 cm long centrifuge tubes in a laboratory swing out centrifuge. The top of the tubes were 2 cm away from the axis. The rotation speed was10, 000 rpm. Calculate the complete sedimentation time. [4]

7. What are the different types of membranes for membrane based separations? [4]

8. Explain the principle of hydrodynamic chromatography [4]

9. What is constant rate filtration? Explain in brief. [4]

10. What is reverse phase adsorption? [4]

11. List any four properties of biological molecules important for bio separation. Explain each of them in brief. [4]

12. Write short note on any one [3]
    i. Affinity binding
    ii. Solvent extraction