R09

Code: 9A23401

B.Tech II Year II Semester (R09) Supplementary Examinations December/January 2015/2016

MASS TRANSFER OPERATIONS

(Biotechnology)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

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1 (a) Describe and conduct the Stefan's experiment.
(b) Explain and summarize the gas diffusion and liquid diffusion.

2 (a) Show that the Sherwood number is a dimensionless number.
(b) Explain the diffusion between phases.
(c) Summarize the equilibrium distribution of a solute between gas and a liquid phase at constant temperature for inter-phase mass transfer.

3 A liquid mixture containing 40 mole % n-heptane and 60 mole % n-octane ($\alpha = 2.16$) is subjected to differential distillation at atmospheric pressure, with 60 mole % of the liquid distilled. Compute the composition of the composited distillate and the residue.

4 (a) Explain and draw the neat sketch of multistage extraction process.
(b) Demonstrate liquid-liquid extraction and estimate the efficiency of single stage extraction processes.
(c) Summarize the working principle of extraction processes.

5 (a) Explain the heat of adsorption and describe the classification of heat adsorption.
(b) Describe the different types of adsorption isotherms.
(c) Summarize the adsorption hysteresis.

6 (a) Explain and formulate the rotary dryer.
(b) Explain the following terms:
(i) Bound moisture.
(ii) Constant rate period.
(iii) Dry basis.
(iv) Falling rate period.

7 (a) Write short notes on applications of reverse osmosis.
(b) Summarize the hollow-fiber separation assembly.
(c) Discriminate osmosis and reverse osmosis.

8 (a) Explain with process flow diagram of distillation of alcohol from fermentation broth.
(b) Write the different applications of various mass transfer operations in bioprocess engineering.

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