

- 8 Among member(s) of lignocellulosic waste, i) starch, ii) cellulose, iii) hemicellulose and iv) lignin, _____ is/are heteropolymer in nature.
a) i, ii b) iii, iv c) iv d) iii

Q.2 Answer the following (Any seven) (14)

1. What are the basic importance of metabolic engineering?
2. How altering gene expression is beneficial for metabolism?
3. What is singularity?
4. What are the fundamentals of metabolic flux balance analysis?
5. Briefly explain E4P is rate limiting step.
6. Schematically present the strategies for engineering of PHA production.
7. Briefly explain increasing product selectivity in antibiotic synthesis.
8. Role of bioinformatics in reconstruction of metabolic pathways.
9. Briefly describe the properties of yeast as a host for expression of genes.

Q.3 a) Enlist various cellular transport process and give detailed note on active transport system. (06)

b) Explain different types of nodes based on branch point rigidity. Explain self regulatory branch point control in detail using isocitrate splitting reaction. (06)

OR

b) State and derive Briggs-Haldane equation for steady state assumption. (06)

Q.4 a) Give comparative account on change in flux distribution in *E. coli* for the production of DAHP from PTS and non-PTS sugar. (06)

b) What is metabolic control analysis? Explain in detail flux control coefficient. (06)

OR

b) Explain the determined system using example of citric acid production in *Candida lipolytica*. (06)

Q.5 a) Write a detail note on metabolic engineering of β -lactam antibiotics biosynthesis by increasing enzyme activity. (06)

b) Discuss in detail about solventogenic pathway in *Cl. acetobutylicum* (06)

OR

b) Explain in detail production of L-Cysteine with the metabolic engineering of sulfur incorporation. (06)

Q.6 a) Discuss the degradation of toluene by *Pseudomonas putida* mt-2. (06)

b) Why increasing the substrate range is important? Explain the strategies required for utilization of starch by *Saccharomyces cerevisiae* for ethanol production. (06)

OR

b) Write a detail note on DNA microarray fabrication. (06)