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SEAT No._____

[A-24]

Sardar Patel University
External Theory Examination
PS09CIGIB3 (Metabolic Engineering)
Thursday, 26th April 2018
02:00 p.m. to 05:00 p.m.

Total marks: 70

Q.I **Multiple choice questions:** **(08)**

1 _____ reaction is independent of the concentration of any of the reactants.
a) Zero order
b) First order
c) Second order
d) All of above

2 Fueling reactions produce the _____ precursor metabolites needed for biosynthesis.
a) 10
b) 11
c) 12
d) 13

3 Number of metabolic fluxes is lower than the number of mass balances is a _____
(a) Over-determined System
(b) Under-determined System
(c) Determined System
(d) None of above

4 The shikimate pathway for the formation of aromatic compound is not present _____
(a) Plants
(b) Animals
(c) Prokaryotes
(d) Eukaryotic microorganism

5 Engineering of metabolic pathways typically involves _____
(a) Overexpression of gene
(b) Deregulation of enzymes
(c) Deregulation of promoters
(d) all of above

6 Recycling of PEP can be achieved by over expression of _____
(a) Pyk
(b) *pps*
(c) *ppc*
(d) Isomerase

7 Polyhydroxyalkanoates (PHAs) are the polymers of _____
(a) hydroxyalkoloids
(b) hydroxyalkyls
(c) hydroxyalkanoates
(d) a and b both

8 In a microarray procedure, which molecule is labeled with fluorescent tag
(a) mRNA
(b) ssDNA
(c) dsDNA
(d) cDNA

Q.II **Answer the following (Any Seven)** **(14)**

1. What are the basic importances of metabolic engineering?
2. How altering gene expression is beneficial for metabolism?
3. Which are general concerns for metabolic engineering?
4. What is Metabolic control analysis?
5. What is the importance of engineering anaplerotic reaction?
6. Write down a role of Antisense RNA in metabolic engineering?

[P.T.O]

7. What is the functional genomics?
8. Briefly describe the properties of yeast as a host for expression of genes
9. What is the importance of metabolomics in metabolic engineering

Q.III **(a)** State and Derive M.M. equation for steady state kinetics **(06)**

(b) Write a detailed note on enzyme inhibition. **(06)**

OR

(b) What is metabolic network? Discuss the nodes with their classifications **(06)**

Q.IV **(a)** Explain metabolic engineering of *E. coli* for the production of DAHP by non-PTS sugar **(06)**

(b) What is metabolic control analysis? Explain in detail Elasticity coefficients **(06)**

OR

(b) Explain in detail metabolic engineering of aromatic pathway for the production of chorismate in *E. coli.* **(06)**

Q.V **(a)** Explain in detail about production of PHA under non-PHA producers. **(06)**

(b) Discuss about the impact of growth limitation for the production of Lysine. **(06)**

OR

(b) Write a detail note on genetics of *Clostridia* used for solvent production. **(06)**

Q.VI **(a)** Write a detail note on DNA mircoarray **(06)**

(b) Define recalcitrant compounds. Discuss the degradation of toluene pathway of *Pseudomonas putida* mt-2 **(06)**

OR

(b) What is functional genomics? Narrate how understanding cellular process at systemic levels help in devising better metabolic engineering strategies. **(06)**