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(A-30) No. of Printed Pages: 02

Sardar Patel University

MSc Integrated Biotechnology Examination -Semester 9

PS09CIGIB3: Metabolic Engineering

Wednesday, 22nd April, 2015

10:30 am to 1:30 pm

Note: **Total Marks: 70**

1. Figures to the right indicate marks.
2. Draw neat and labelled diagram, wherever necessary.

Q.1 **Multiple choice questions** [08]

1 Any molecule interact directly with an enzyme to lower its catalytic rate is called _____.
a) Regulator b) repressor c) inhibitor d) moderator

2 Recyling of PEP can be achieved by over expression of _____.
a) PyK b) PPS c) PPC d) isomerase

3 Sensitivity coefficient of A toward B is of high magnitude and with +Ve sign. If A is over express than B will be_____ .
a) no Change b) increase in proportion to A
c) decrease in proportion to A d) increase several fold more than A

4 Submissions theorem depicts that the sum of Flux control coefficient of the metabolic network is _____.
a) 1 b) 2 c) 3 d) -1

5 First committed step of a aromatic compound synthesis in E. coli carried out by fusion of _____ and _____ .
a) E4P & G6P b) G3P & E4P c) G3P & PEP d) E4P & PEP

6 Following is strategy for increasing the antibiotic biosynthesis.
a) increasing the activity of enzyme involved in the pathway
b) increasing the resistance toward antibiotic produced
c) manipulating regulatory genes
d) all above

7 Lignocellulose is consist of _____ .
a) cellulose & lignin b) Hemicellulose & lignine c) cellulose & hemicellulose
c) all

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

Q.2 **Attempt any seven** [14]

1 What is the importance of anapluretic reactions?

2 What are precursor metabolites in central metabolism?

3 Define flux control coefficient.

4 Briefly explain, "E4P is rate limiting step in aromatic compound synthesis not PEP".

5 Enlist pillars of metabolic control analysis.

6 What is dilution effect?

7 Compare bioplastic with petroleum derived plastic.

8 Briefly describe engineering strategies to improve ethanol production using non amylolytic yeast grown on starch as substrate.

9 What is the importance of studies on metabolomic?

Q.3 A Write a detailed note on competitive inhibition. [06]

B Comment on "metabolic engineering can be used for understanding the cellular function at systemic level". [06]

OR

B What is metabolic network? Discuss the nodes with their classification. [06]

Q.4 A Write a note on flux balance analysis. [06]

B Describe the shikimate pathway for biosynthesis of aromatic amino acids. [06]

OR

B Discuss reaction modes involved in the production of DAHP (3-deoxy-D-arabinose heptulosonate 7-phosphate). [06]

Q.5 A "For cloning in PHA non producer, PHA synthesis pathway of *Alcaligens eutrophus* is prefered over *Rhodospirillum rubrum*" Comment. [06]

B Narrate the engineering of sulphur incorporation step in L-Cysteine synthesis. [06]

OR

B Discuss in detail about redox balance of solventogenic pathway in *Cl. acetobutylicum*. [06]

Q.6 A Write a detailed note on DNA microarrays. [06]

B Define functional genomics. Narrate how understanding cellular processes at systemic level helps in devising better metabolic engineering strategies. [06]

OR

B Define recalcitrant compounds. Discuss degradation of toluene pathway of *Pseudomonas putida* mt-2. [06]

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