(A-8) Seat No.:_____

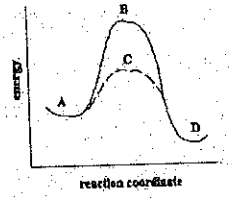
No. of printed page: [02]

Sardar Patel University
External Theory Examination
Friday, 21st October 2016
10:00 A.M. to 01:00 P.M.
PS09CIGGB3/ PS09CIGIB3-Metabolic Engineering
M.Sc. (Integrated) SEM- IX
Total marks: 70

Note: 1. Attempt all the questions (including multiple choice questions)
2. Draw neat and labeled diagram wherever necessary.

Q.1 **Multiple choice questions:** **(08)**

1 _____ process by which information from a gene is used in the synthesis of a functional gene product.
a) Transcription c) Translation
b) RNA splicing d) All of the above

2 

This is a graph describing energy versus reaction coordinate for a catalyzed and uncatalyzed reaction. The terms i) ES, ii) S, iii) P, and iv) Uncatalyzed reaction are represented either by A, B, C, and D. The correct letter that corresponds to each stage of the graph are represented by _____.
a) ii, i, iv, iii c) i, iii, iv, ii
b) ii, iii, iv, i d) iii, i, iv, ii

3 If number of measured metabolic fluxes is lower than the number of reactions present in the pathway, the unmeasured reactions can be calculated by following equations represented in _____.
a) Over-determined System c) Determined System
b) Under-determined System d) None of above

4 For understanding carbon commitment from central metabolism toward aromatic amino acid, *E. coli* with mutant of _____ gene is used.
a) aroA b) aroB c) aroG d) aroF

5 The PHB production was first time observed in _____
a) *Alcaligens eutrophus* c) *Rhodospirillum rubrum*
b) *Bacillus magaterium* d) *Bacillus licheniformis*

6 Following group of antibiotic is produce by giant modular enzymes resembling the formation of long chain fatty acid synthesis.
a) polyketides c) macrolides
b) beta-lactums d) glycosides

7 Following is **NOT** true for PCB degradation.
a) provides energy and carbon in initial transformation process
b) more the clorination slower the degradation
c) PCB has two phenyl rings
d) ring opening is required for degradation of PCB

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

[P.T.O.]

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

1. Explain different types of nodes based on branch point rigidity.
2. Define metabolism.
3. What is singularity?
4. Briefly explain summations theorem.
5. Briefly explain E4P is rate limiting step.
6. Schematically present strategies for PHA production.
7. Briefly explain increasing product selectivity in antibiotic synthesis.
8. Briefly describe the properties of yeast as a host for expression of genes
9. What is central dogma?

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

b) What is metabolic network? How cell is accessing the cellular conditions for regulation of metabolic network? (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 perturbation of nitrogen regulation in *E. coli* on over expression of PCK gene. (06)

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

b) Discuss in detail about solventogeneic 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) What is system biology? Explain the role of system biology in metabolic engineering. (06)

OR

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

—— X ——