

S.C

**SARDAR PATEL UNIVERSITY**  
M.Sc. (Integrated) Biotechnology (IGGBT), 9<sup>th</sup> Semester Examination  
Thursday, 26<sup>th</sup> April 2018  
02:00 P.M to 5:00 P.M  
PS09CIGGB3: Metabolic Engineering

Note: (1) Figures to the right indicate marks.

Total Marks: 70

(2) Draw a neat and labeled diagram, wherever necessary.

**Q. 1** Choose the most appropriate answer from the four alternatives given:

- (1) An inhibition in which molecule shares the characteristics with substrate is \_\_\_\_\_ [8]  
(a) Competitive (b) Non- Competitive (c) Un Competitive (d) A and B both
- (2) Any molecule interact directly with an enzyme to lower its catalytic rate is called \_\_\_\_\_  
(a) Regulator (b) Repressor (c) inhibitor (d) moderator
- (3) If number is measured metabolic fluxes is lower than number of reactions present in the pathway, the unmeasured reactions can be calculated by following equations represented in \_\_\_\_\_  
(a) Over-determined System (b) determined System (c) Under determined System  
(d) None of the above
- (4) Determination of carbon commitment toward aromatic compound synthesis in *E.Coli* carried out using deletion mutants of \_\_\_\_\_  
(a) AroA (b) AroB (c) AroD (d) AroG
- (5) There are \_\_\_\_\_ key precursor metabolites needed for biosynthetic reaction in *E.Coli* cell.  
(a) 10 (b) 12 (c) 14 (d) 16
- (6) Availability of \_\_\_\_\_ is rate limiting for  $\beta$ -lactum group of antibiotics  
(a) Alanine (b) Cystine (c) Valine (d) AAA
- (7) Lignocellulose is consist of \_\_\_\_\_  
(a) cellulose and lignin (b) hemicelluloses & Lignine (c) cellulose and hemicellulose (d) all of the above
- (8) In the Microarray procedure, which molecule is labeled with fluorescent tag?  
(a) m RNA (b) ss DNA (c) ds DNA (d) cDNA

**Q-2** Answer any SEVEN from the following:

- (1) Define pathway  
(2) Enlist types of node.  
(3) Explain transport of metabolite through diffusion.  
(4) Explain the basic theory of metabolite flux balance analysis.  
(5) Explain summations theorem in brief.

[PTO]

- (6) What is heterotrophic fermentation?
- (7) How end product analogues deregulate the feedback inhibition mechanism?
- (8) Compare bioplastic with petroleum derived plastic.
- (9) Why lignocellulosic waste is not easy to degrade?

Q.3 (a) Enlist transport mechanisms write a detailed note on active transport mechanism for sugar uptake. [6]

(b) Write detail note on TCA [6]

OR

(b) Describe the basic steps required to overexpress the gene. [6]

Q.4 (a) What is MCS? Write a detailed note on flux control coefficient. [6]

(b) Why dilution effect is considered as negligible? Explain in detail. [6]

OR

(b) Explain the perturbation in the regulation of nitrogen observed on over expression of *PPC* gene. [6]

Q.5 (a) "For cloning in PHA non producer, PHA synthesis pathway of *Alcaligenes eutrophus* is preferred over *Rhodospirillum rubrum*" Justify. [6]

(b) Discuss in detail about the redox balance in solventogenic pathway of *Clostridium acetobutylicum*. [6]

OR

(b) Narrate the increase in selection and increase flux through change in enzyme activity using  $\beta$ -lactum antibiotics as an example. [6]

Q.6 (a) What is functional genomics? Explain its role in understanding cellular processes at systemic level for devising better metabolic engineering strategies. [6]

(b) Write detailed note on analysis of DNA microarrays data. [6]

OR

(b) What are recalcitrant compounds? Discuss the TOL plasmid of *Pseudomonas putida* mt-2 for degradation of toluene. [6]

————— x —————