Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **19BT3017** | **Duration :** | **3hrs** |
| **Sub. Name :** | **METABOLIC REGULATION AND ENGINEERING** | **Max. Marks :** | **100** |

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| **Q. No.** | **Sub Div.** | **Questions** | **Course Outcome** | **Marks** |
| **ANSWER ANY FIVE QUESTIONS (5 x 16 = 80 Marks)** | | | | |
| 1. | a. | Classify the cellular metabolic reactions based on their purpose and briefly discuss their integrity in a cellular system. | CO1 | 10 |
| b. | What role does metabolic engineering would possibly have in deciphering the metabolic network? | CO1 | 6 |
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| 2. | a. | Outline the procedural details of Flux balance analysis (FBA) for studying biochemical networks. | CO6 | 10 |
| b. | Discuss the strategies to be adopted for over-determined and under-determined systems. | CO6 | 6 |
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| 3. | a. | Explain the scenarios where the Stoichiometric MFA cannot resolve metabolic flux in a cellular system. | CO5 | 6 |
| b. | Describe the protocol (and underlying principle) pertinent to substrate selection, experimental duration, and analytical approach adopted while carrying out 13C MFA experiments. | CO5 | 10 |
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| 4. | a. | Explain the inter-relationship between Flux control coefficients, Summation theorem and FC connectivity theorems. | CO3 | 10 |
| b. | How would you be predicting the results of perturbation experiments for MCA? | CO3 | 6 |
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| 5. | a. | Deduce the mathematical relationship describing the change of velocity, and substrate saturation in the presence of competitive inhibitor, in an enzyme-catalyzed reaction. | CO2 | 10 |
| b. | Explain the different variant of feed-back inhibition modality existent in metabolic pathways. | CO4 | 6 |
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| 6. |  | Discuss the different metabolic engineering strategies tested for re-routing metabolic resources for ethanol production. | CO2 | 16 |
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| 7. | a. | Discuss the importance of isotopic steady-state in 13C MFA analysis. How the different isotopic composition is is generally analyzed? | CO5 | 6 |
| b. | Give a fundamental description of *lac* operon model as a transcriptional level control. | CO4 | 10 |
| **COMPULSORY QUESTION (1 x 20 = 20 Marks)** | | | | |
| 8. |  | Illustrate the different metabolic engineering strategies adopted in *Pseudomonas putida* to expand sucrose utilization. | CO2 | 20 |