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

  
**End Semester Examination – Nov/Dec – 2018**

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| **Code :** | **18BT3017** | **Duration :** | **3hrs** |
| **Sub. Name :** | **METABOLIC REGULATION AND ENGINEERING** | **Max. marks :** | **100** |

**ANSWER ANY FIVE QUESTIONS (5 x 16 = 80 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Classify the different cellular reactions based on their primary function in cell synthesis. | CO1 | 6 |
| b. | Summarize the cellular reaction involved in glycolytic pathways and their interaction in central metabolism | CO1 | 10 |
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| 2. | a. | Derive the Michaelis-Menten relation for enzyme kinetics. Illustrate how the rapid equilibrium and Steady State assumptions can be utilized to derive the rate of enzymatic reaction. | CO2 | 10 |
| b. | Explain the influence of a competitive inhibitor on maximum velocity and rate constant (*K*m) in an enzyme-catalyzed reaction. | CO2 | 6 |
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| 3. |  | Give an overview of *different metabolic engineering approaches* been adopted in laboratories/ industries to improve ethanol production. Substantiate your review with an appropriate diagram. | CO3 | 16 |
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| 4. |  | Explain the Linearized Kinetic Relation with Elasticity Parameters for MCA with appropriate example. | CO4 | 16 |
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| 5. | a. | Explain the requirement for a steady-state assumption with respect to intracellular metabolites in MFA | CO5 | 4 |
| b. | Construct the flux vector for the intracellular metabolite for the given pathway. Evaluate, whether the intracellular flux can be calculated if extracellular substrate and product concentration are measured? | CO5 | 12 |
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| 6. | a. | Illustrate specific advantages of 13C Metabolic flux analysis. | CO5 | 6 |
| b. | Describe the illustrative protocol while performing the 13C analysis. What kind of substrates and substrate combinations may be utilized for better resolution? | CO5 | 10 |
|  |  |  |  |  |
| 7. |  | What is the yield coefficient? Explain, how this can be utilized in microbial growth and product formation kinetic analysis? | CO1 | 16 |
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| **COMPULSORY QUESTION (1 x 20 = 20 Marks)** | | | | |
| 8. |  | Illustrate the metabolic engineering strategies that have successfully been verified for high glycerol production by the *S. cerevisiae.* | CO6 | 20 |