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



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

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| **Code :** | **14BT2047** | **Duration :** | **3hrs** |
| **Sub. Name :** | **BIOCHEMICAL ENGINEERING** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Discuss in detail various methods to isolate industrially important microorganisms from soil. | CO-1 | 20 |
| (OR) | | | | |
| 2. | a. | Classify chemical and biochemical process with its advantages and disadvantages in detail. | CO-1 | 20 |
|  |  |  |  |  |
| 3. | a. | Derive Michealis Menten equation for single substrate reaction without inhibition. Also add a note on how MM parameters are estimated with neat graphs. | CO-1 | 20 |
| (OR) | | | | |
| 4. | a. | Derive the kinetic equation for Non-competitive and Competitive substrate enzyme inhibition. | CO-2 | 20 |
|  |  |  |  |  |
| 5. | a. | The production of penicillin was carried out in a batch reactor and the following data were obtained.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Time (hr)** | **Glucose concentration (g/l)** | ***Penicillium chrysogenum* concentration (g/l)** | **Penicillin concentration**  **(g/l)** | **Ethanol Concentration**  **(g/l)** | | 0 | 150 | 2.1 | 0 | 0 | | 5 | 135 | 2.5 | 3.2 | 0.15 | | 15 | 107 | 3.2 | 3.5 | 0.23 | | 30 | 89 | 6.7 | 6.1 | 0.45 | | 40 | 72 | 12.1 | 8.4 | 0.5 | | 50 | 55 | 16.8 | 10.7 | 0.77 | | 60 | 40 | 25.7 | 13.9 | 1.3 | | 70 | 21 | 28 | 19 | 5 |   Determine carrying capacity coefficient, net specific growth rate, growth rate @50hrs, biomass and product yield coefficient, doubling time and max cell concentration if 24gm/l and 150 g/l of biomass and glucose are used as inital inoculum and substrate concentration respectively. | CO-2 | 20 |
| (OR) | | | | |
| 6. | a. | What do you mean by unstructured and non- segregated model? Derive any two unstructured and non segregated model. | CO-2 | 20 |
|  |  |  |  |  |
| 7. | a. | Discuss in detail about various methods to determine KLa. List out the disadvantages of using sulphite oxidation and gassing out methods. | CO-3 | 20 |
| (OR) | | | | |
| 8. | a. | A fermentation process requires 8.7 liters batch of complex medium to be steam sterilized at 121 °C. Assuming that the medium before sterilization contains l019 bacterial spores of *Bacillus stearothermophilus* per ml and the probability of non-sterility after sterilization is 1 in 1000, determine the holding time at 121°C and ▼holding. The time of heating from 100°C to 121°C is 19 min and the time of cooling from 121°C to 100°C is 14 min. Assume that the spore death below 100°C is insignificant. And the value of ▼table=12.549, A=9.5x1037min-1, E=283 KJ/mol and R=8.314 J/(mol K). | CO-2 | 20 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. | a. | Elaborate on the Working and principle of packed bed and fluidized bed bioreactors with a neat sketch and also state its advantages and disadvantages | CO-3 | 20 |