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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – April / May – 2017**

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|  |  |  |  |
| **Code :** | **14BT2015** | **Duration :** | **3hrs** |
| **Sub. Name :** | **BIOREACTOR ENGINEERING** | **Max. marks :** | **100** |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Q. No. |  | Questions | Course  Outcome | Marks |
| 1. |  | Find the stoichiometric coefficients, Biomass & product yield co-efficient, degrees of reduction of substrate and bacteria for the given biological reaction when RQ = 0.9?  C6H5COOH + a O2 + b NH3 cC5H7NO2 + d H2O + e CO2 | CO2 | 20 |
| (OR) | | | | |
| 2. |  | Discuss in detail about batch growth kinetics and derive the kinetic expression for various stages of growth. | CO1 | 20 |
|  |  |  |  |  |
| 3. |  | For the following data, calculate net specific growth rate, growth rate at time 30 hrs, doubling time, biomass and product yield coefficient, maximum cell mass concentration if     |  |  |  |  | | --- | --- | --- | --- | | Time  (hr) | Glucose  concentration (g/l) | *S. cerevisiae*  concentration  (g/l) | Ethanol  concentration  (g/l) | | 0 | 100 | 0.25 | 0 | | 5 | 97 | 2.52 | 2.7 | | 10 | 87 | 3.21 | 3.9 | | 15 | 74 | 6.72 | 6.5 | | 20 | 63 | 12.11 | 9.7 | | 25 | 52 | 16.81 | 10.1 | | 30 | 39 | 25.72 | 12.7 | | 35 | 21 | 29.32 | 19.7 | | CO2 | 20 |
| (OR) | | | | |
| 4. |  | What is unstructured and Non segregated model? Derive the expression for any two unstructured models. | CO2 | 20 |
|  |  |  |  |  |
| 5. |  | Explain in detail about sulphite oxidation method and oxygen balance technique to determine KLa? | CO3 | 20 |
| (OR) | | | | |
| 6. |  | With a neat diagram explain in detail about various types of aerators and agitators. | CO1 | 20 |
|  |  |  |  |  |
| 7. |  | Explain the bioreactor consideration of fluidized bed bioreactor with a neat sketch. | CO1 | 20 |
| (OR) | | | | |
| 8. |  | Explain the bioreactor consideration of Chemostat with a neat sketch. | CO1 | 20 |
|  | |  |  |  |
|  | | **Compulsory:** |  |  |
| 9. |  | Elaborate on various types of sensors and any five parameter that can be monitored and controlled during fermentation process in detail. | CO1 | 20 |