

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION MO/2024)**

**CLASS: BTECH
BRANCH: BIOTECHNOLOGY**

**SEMESTER : III
SESSION : MO/2024**

SUBJECT: BE206 CHEMICAL PROCESS CALCULATIONS

TIME: 02 Hours

FULL MARKS: 25

INSTRUCTIONS:

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates
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- Q.1(a) One type of anaerobic respiration converts glucose($C_6H_{12}O_6$) to ethanol (C_2H_5OH) and carbon dioxide (CO_2). If the molecular weight of glucose is 180 grams/mol and the molar mass of ethanol is 46 g/mol, how many grams of carbon dioxide are produced when 1 mol of glucose is digested via respiration? [5] CO CO1 BL Understanding
- Q.2(a) In biological system enzymes are used to accelerate the rates of certain biological reactions. Glucoamylase is an enzyme that aids the conversion of starch to glucose (a sugar that cells use for energy). Experiments show that 1 μ g mol of glucoamylase in a 4% starch solution results in a production rate of glucose is 0.6 μ g mol/ (mL)(min) . Determine the production of glucose for this system in the units lb mol/ (ft³)(day) [5] CO1 Applying
- Q.3(a) A liquified mixture of n-butane, n-pentane and n-hexane has the following composition in weight percent: [5] CO1 Analyzing
- | | |
|----------------|-----|
| n- C_4H_{10} | 50% |
| n- C_5H_{12} | 30% |
| n- C_6H_{14} | 20% |
- Calculate the (a) weight fraction (b) mol fraction (c) mol percent of each component (d) average molecular weight of the mixture.
- Q.4(a) A binary mixture consists of 35% benzene and 65% toluene are continuously fed to the distillation column at rate of 1000 lb mole/hr. The distillate (top product) contains 85 mol. % benzene, whereas the residue (bottom product) contains 95 mol. % toluene. Calculate the quantities of distillate and residue obtained per hour. [5] CO2 Evaluating
- Q.5(a) Soya bean seeds are extracted with hexane in batch extractors. The flaked seeds are found to contain 18.6% oil, 69% solids, and 12.4% moisture by weight. At the end of the extraction process, cake (meal) is separated from hexane-oil mixture. The cake is analyzed to contain 0.8% oil, 87.7% solids, and 11.5% moisture by weight. Find the percentage recovery of oil. Basis 100 kg of flakes seeds [5] CO2 Evaluating

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