Chemical Engineering Department
College of Engineering
King Saud University
ChE 201 – ChE Principles I

Time= 90 minutes **Test # 2** **26/1/1431**

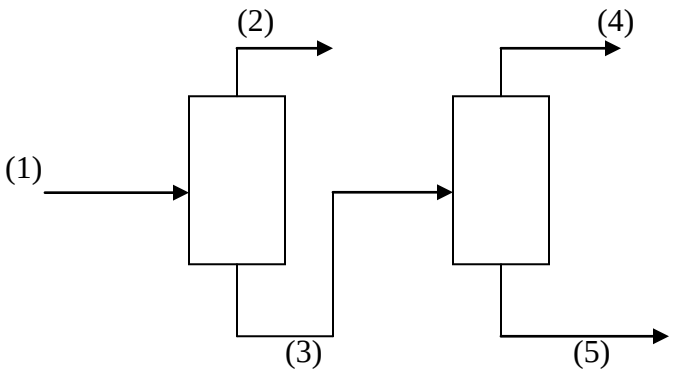
Answer **ALL** questions

Question 1 (4 points)

It is required to produce a 15 mass % sugar solution from a 30 mass % sugar solution by adding pure water. **Calculate** the mass ratio of pure water to the 30% sugar solution.

Question 2 (10 points)

500 kg/s of a mixture (stream 1) containing **A** (50%)**, B** (30%) and **C** (20% by weight) is separated in a distillation column to two streams. The top stream (stream 2) contains **A** (90%) and **B** and the bottom stream (stream 3) contains **A, B** and **C.** The bottom stream is further separated in another distillation column to give: (a) a top stream (stream 4) rich in **B** (90%) and **A** (10%) and (b) a bottom stream (stream 5) rich in **C** (95%) and **B**.
(see the diagram below).



Calculate the flow rate AND composition of stream 3.

Question 3 (6 points)

The following reaction takes place in isothermal reactor:

$$C_4H_{10} \rightarrow C_2H_4 + H_2$$

The feed to reactor contains: Butane (C_4H_{10})=90% and Inert (I)=10%mol. 80% conversion of butane is achieved in the reactor. If the feed rate is 500 mol/s, **calculate** the molar composition of the product.