

**REVIEW SET 1**

work before class on September 29, 2008

*Note* – will not be collected or graded = self correct during class.

NAME : \_\_\_\_\_

Ch. E. 453

September 24, 2007

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**EXAM NO. 1**

Open Book and Notes

(20 points)

1. You have recent quotes for two fixed tube sheet heat exchangers :

<u>Exchanger</u>	<u>Area, ft<sup>2</sup></u>	<u>material</u>	<u>Date</u>	<u>Cost</u>
A	500	SST	6/13/2007	\$ 9,460.
B	2000	SST	6/21/2007	\$ 20,000.

If the M&S index is increasing at 21 points per quarter, estimate the purchase cost of a similar design 950 ft<sup>2</sup> heat exchanger in January 2008.

(20 points)

2. If a plant produces 1,000,000 cases per year of product for \$2,400,000/year total product cost and its production is 68% variable costs and 32% fixed costs, what would the cost per case be when producing 1,250,000 cases per year ?

(20 points)

3. Your company has proposed to build a frying oil recovery system which will capture 1,100 gallons per day of hydrogenated canola oil from the crumbs screened out of a battered potato French fryer. The plant will operate 275 days per year and the frying oil has a market value of \$ 2.97/gallon. The recovery system will be licensed from U.S. Patent # 5,487,907 and consists of a series of proprietary water-crumbs jet ejector units which capture the crumbs at the various generation points and associated pumps and piping to transport the water-crumbs slurry to the patented recovery process equipment. The separation equipment consists of a heat jacketed continuous stirred tank reactor followed by two gravity liquid-liquid settlers. The first settler separates the oil from the crumb-water slurry while the second operates as a clarifier separating water for recycle to the jet ejector units and a thickened sludge. The sludge is further dewatered with a drum dryer before disposal to landfill.

**Estimate the 2<sup>nd</sup> Quarter 2007 Fixed Capital Investment ?**

State all assumptions and explain your reasoning.

( 20 points )

4. During the month of October, the following financial information was obtained in a polyethylene glycol antifreeze manufacturing plant :

Salaries	-	\$3,000
Delivery expenses	-	\$700
Rent	-	\$400
Sales	-	\$15,100
Antifreeze inventory	-	\$1,300 at cost on September 30
Antifreeze manufactured		
during October	-	\$18,900 at cost
Antifreeze inventory	-	\$11,600 at cost on October 31
Other expenses	-	\$1,200
Earned surplus	-	\$800 before income taxes on September 30

Prepare an income statement for the month of October :

- A) What is the October profit before taxes ?
- B) What is the total earned surplus at the end of October ?

( 20 points )

5. A preliminary estimate is to be made of the purchased equipment and installation cost for a pumping system. The pump is to be used for the steady delivery of **900** gallons per minute of ethanol at **85 °F** and **250** PSI. Estimate the 2<sup>nd</sup> quarter **2007 total installed cost** for the centrifugal pump and electric motor. {use horizontal API-610 cast steel casing}.