Department of Computer Systems Engineering
University of Engineering and Technology
Peshawar, Pakistan

CSE-305 Engineering Economics, Fall 2023
Assignments # 01 & 02

Total Marks: 20 **Submission Deadline: Nov 20th, 2023**

INSTRUCTIONS

1. Attempt **ALL** questions in a precise and to-the-point manner.
2. Extra details will not add any weight to the attained marks.
3. Plagiarism is strongly discouraged.
4. You can take help from available resources but do not just copy them and also do not forget to refer to the resources used.

ASSIGNMENT 01 (CHAPTER 01)

Perform a detailed Engineering Economics Analysis Process for the following case studies. Also discuss different aspects such as engineering decision areas, engineering economics principles, and predicting the future.

Query 01: **[CLO-1]**

Mr. Samuel: Mr. Samuel is a heating and air conditioning repair business that was established 23 years ago. Today the business revolves around 20 vans that are on the streets and another four for backup in the shop. The 20 vans are not all out at once as there is day, night, and weekend coverage using 32 technicians. Each technician is assigned to a van, and each van has only one or two technicians assigned to it. Determine least cost operations and replacement schedule for Mr. Speedy including depreciation.

Query 02: **[CLO-1]**

The project management team of your firm is planning to expand the operations and performance of the firm by upgrading employee-related facilities and adding new employees. The project management team analyzed multiple feasible alternatives that involve either the upgradation of existing employee facilities or adding new highly experienced employees. Now you have been selected to lead the operations and performance, post-evaluation team. Delineate your technical plan for comparing the estimated consequences of implementing the selected alternative with the expected results that can be achieved.

Query 03: **[CLO-1]**

A free lunch? "We will install new HVAC (Heating, Ventilation, and Air Conditioning) equipment for you, absolutely free!! Just sign a three-year contract to split 50/50 of any savings the equipment

generates on the use of equipment plus pay for a service contract for the equipment's maintenance. We will take out the loan for the equipment and installation and pay off the loan with our share of the savings. After three years, the equipment is yours! You'll only be giving us some of the money you are paying to the power company for electricity. The service contract for the equipment is $15,000 per year, but think of your peace of mind!" Evaluate if this is a free lunch or if there is a catch somewhere based on other financial data available. What data would you need? What evaluation criteria would you choose?

ASSIGNMENT 02 (CHAPTER 02)

Find the unknowns in the following case studies both mathematically and graphically.

Query 01: **[CLO-2]**

Dawlence Pvt. is planning to introduce a new range of electronics in the market. The existing statistics for the product state that the sales price for one of its products and the quantity sold per month are related as D= 980-15p units, where p is the price per unit item. The fixed costs are estimated to be 1800 per month and the variable cost is $45 per unit produced. Determine the number of products that must be produced for maximum net profit. What is the net profit per month related to the product? What is the profitable range for this product? What is the number of products that must be produced for the company to reach its maximum total revenue? Draw the Demand versus Total Revenue function graph and mark all these demands on it.

Query 02: **[CLO-2]**

Smart Chips Inc. estimates that it will increase its ICs sales volume by decreasing the selling price of its ICs. The revenue function is given by $aD\text{-}bD^2$ where D represents the units of demand of ICs per month. The fixed cost is $1450 per month and the variable cost is $5.5 per unit item. If a = $5.6 and b= $0.0125, determine the volume for maximum profit, maximum profit per month, range of profitable demand, and maximum total revenue.

Query 03: **[CLO-2]**

A semiconductor plant has 95% of sales due to single-circuit design and has the capacity to produce up to 3,000,000 printed circuit boards (PCBs) per year. If the plant is operating at 60% of its capacity with a selling price per unit item equal to $\$19.25 - 0.000002D$ and the variable cost per PCB is $15.57. The fixed costs of the PCB are $1,000,000 per year at zero output. What is the profitable range for PCB production? If the variable cost per unit is reduced by 10% and the fixed costs are reduced by 15%, what would be the effect on the demands on which the breakeven operation occurs?

Query 04: **[CLO-2]**

A freelancer provides the services of drafting and graphic designing and has thus far been able to control the volume of his services by varying the selling price. He is seeking to maximize his net profit and has concluded that the relationship between the price and demand of his services can be given by $D= 500\text{-}5p$, where p is the selling price per unit service in dollars. His fixed costs for managing the services are $1,000 per month and the variable cost is $25 per service. What is the optimal number of services for max profit to attain? What is the maximum profit for this demand? Also, measure the profitable range for this scenario.

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