Description

For this assessment, suppose that you are the operations manager for ABC Manufacturing, a small manufacturing company founded three years ago. ABC has been manufacturing and selling an electric motor for the past year, but the company has not always had sufficient workers assigned to manufacturing this electric motor in order to satisfy demand. ABC's president asked you to plan for the production of this motor for the next six months.

You have decided you will use a level aggregate plan for the electric motor, meaning that you will manufacture the same number of units each month. ABC's president has told you that some customers order this motor well in advance of when needed, and thus it is allowable to have backorders, if needed. You know there are currently 150 units in inventory (starting inventory = SI), and ABC's marketing manager estimates that the demand for the motor (in units) for each of the next six months (M = 6) will be 240, 225, 265, 270, 260, and 275 (D1, D2, D3, D4, and D5 respectively). You have decided you would like to reduce average inventory level of several products (including this one), and you want to have 50 units in inventory six months from now (ending inventory = EI).

Directions
Briefly describe the operations management issue in the ABC Manufacturing scenario and describe how you would approach an analysis. Then complete the following problems based on the scenario and provide answers to the algebraic equations.

Question 1. Refer to the ABC Manufacturing scenario to complete the following:

Provide the algebraic equation for the monthly aggregate production rate (APR, using SI, EI, D1, D2, D3, D4, D5, and M as variables).
Calculate and provide the numerical monthly aggregate production rate rounded to a whole number.
Question 2. Production employees at ABC work an average of 168 hours per month (HPM), and manufacturing the electric motor involves 3.5 total hours of work per unit (HPU).

Provide the algebraic equation for the number of workers (W) needed to meet the above aggregate production rate (using W, APR, HPM, and HPU as variables).
Calculate and provide the numerical number of workers needed.
Question 3. One subcomponent in this electric motor is also used in two other products manufactured by ABC. ABC's president has told you that the company expects to use 5,400 (annual quantity = AQ) of these subcomponents during the next 12 months, with a consistent demand for them month-to-month (and a consistent demand during each month, with the business day daily demand, DQ, being 22). He has further told you that it costs $10 to place an order (order cost = OC) for this subcomponent (regardless of the quantity ordered), that the annual holding cost is $2 per unit (unit holding cost = UHC). Finally, he has stated that out of 21 business days per month, there is a five business day lead time (LT = 5) associated with ordering this subcomponent.

Provide the algebraic equation for the economic order quantity (EOQ, using AQ, OC, and UHC as variables).
Calculate and provide the numerical economic order quantity rounded to the closest whole number.
Question 4. Refer to the ABC Manufacturing scenario to complete the following:

Provide the algebraic equation for the reorder point (RP, using DQ and LT as variables).
Calculate and provide the numerical EOQ, rounded to the closest whole number.
Question 5. Historically, ABC has based its production on estimates from the company's marketing manager. While that has generally been successful, you have decided you would like to factor in an operations management approach to estimating demand.

Describe the following forecasting methods. Provide the math associated with each method and identify the pros and cons of using it:
Naïve.
Simple mean.
Simple moving average.
Weighted moving average.
Exponential smoothing.
Linear trend line.