Written Examination

Industrial Engineering MTT050

Date: 2010-08-23
Time: pm
Place: M

Aids: Chalmers approved calculator (*typgodkänd miniräknare*)

Max points: 50p
Grades: Pass 20p; Grade 4: 30p; Grade 5: 40p.

Questions: Peter Almström tel. 772 1283, 076 1010567

Final results will be published before 2010-09-06.

Times for checking results are 2010-09-06 at 12.30-13.15 and 2010-09-08 at 12.30-13.15.
Place: Materials and Manufacturing Technology, ground floor M2 building (close to student hall).

General instructions: It is your responsibility to formulate your answers in such a way that it is clear for the teacher that you have understood the course content. Express yourself clearly and motivate your answers. **Write with a readable handwriting.** *Use a new sheet for every new question (not for every sub-question). Good luck!*

1. In Swedish manufacturing industry, there is a big gap between operation times in reality and the equivalent times in a manufacturing planning system (MPS).

    a) Describe what happened in the mid-1980's in the Swedish manufacturing industry that led to this gap and how? (2p)

    b) Name and describe four consequences that the Swedish manufacturing industry face today due to this gap? (4p)

2. Imagine a manual assembly station.

    a) Give a productivity measure for the assembly station. (1p)

    b) Imagine different improvement of the assembly work. What factors can be improved in general to improve the productivity? Give realistic figures of improvement and calculate a new productivity for the assembly station. (4p)

3. Name and explain positive and negative aspects of standardization of operations. At (4p)

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least three pros and one con should be explained. One point is given for every aspect.

4. Explain what a PERT chart is and give one practical example of a PERT chart including explanations of its different features. (3p)

5. Give four different reasons for using predetermined time systems. (4p)

6. When a time study is conducted there are some variables that need to be taken into consideration. For example who is executing the study and who is executing the work tasks. Why are these variables important? (2p)

7. Three questions regarding performance rating:

    a) How is standard performance rate defined? (1p)

    b) Who is it valid for? (1p)

    c) Give one standard performance (100% speed) benchmark example. (1p)

8. Give arguments for why companies that manufactures large products in short production series (or even one off products) can benefit from using Design for Assembly (DFA). (3p)

9. Overall Equipment Effectiveness (OEE) is defined by the following formulas:

$$OEE = Availability * Efficiency * Quality\ rate$$

$$Availability = \frac{Planned\ production\ time - stop\ time}{Planned\ production\ time}$$

$$Efficiency = \frac{Theoretical\ cycle\ time * Number\ of\ units}{Running\ time}$$

$$Quality\ rate = \frac{Number\ of\ units - Number\ of\ defective\ units}{Number\ of\ units}$$

Planned production time = Total time - Planned stop time

Running time = Planned production time - stop time

(4p)

Explain how OEE is related to the formula:

Productivity = Method*Performance*Utilization

10. The following picture is taken from the lecture about PPA. Describe the benefits for the three different stakeholders of using PPA.

(3p)

11. Briefly outline (preferably graphically) how a PPA study is performed. (3p)

12. Two sub-questions regarding incentive systems:

What are the benefits of using wage incentives? Give at least two benefits and explain them. (2p)

Which criteria should be fulfilled when introducing an incentive plan? Give at least three different criteria. (3p)

13. Discuss the long term effects of increased productivity in machining operations, both concerning the machine operation it self and the work made by the operator servicing the machine. Include in the discussion consequences for direct an indirect labour. (5p)