

Answering ideas for written exam in TEK421 January 2018

Problem 1 (24 points)

- 1.1 D
- 1.2 C
- 1.3 A
- 1.4 D
- 1.5 A
- 1.6 C
- 1.7 C
- 1.8 C
- 1.9 D
- 1.10 B
- 1.11 B
- 1.12 D
- 1.13 B
- 1.14 A
- 1.15 C
- 1.16 A

Problem 2 (10 points)

The listed mechanisms (6) are expected to be shortly explained in the answer, and how they enhance coordination (can be based on Tuomikangas and Kaipia 2014 article and lecture). If some coordination definition or explanation given, that's a plus.

- Strategic alignment: S&OP links and aligns operational plans and business plans
- S&OP organization: includes the formal S&OP organization structure, ensures that various functions are engaged, and that there are adequate resources
- S&OP process: formal and standardised process and schedule
- Tools and data: to ensure high-quality data used for decision making, and tools to ensure efficient capturing and sharing data
- Performance management: supports reaching the common business targets, enables optimization of performance
- Culture and leadership: creating a company culture in favor of running a company-wide cross-functional planning process

Problem 3 (8 points)

Four V:s that characterize big data are expected to be described in the answer, added with some comments how these characteristics affect the use of data (2 points each), based on the article by Waller and Fawcett (2013) and lecture. For example:

- Volume = scale of data. Data volume is huge, it is captured on more detail, from multiple points. Benefits decision making as the reliability increases as more data is available, challenge is the capability to use and analyse the data.
- Velocity = The rate at which data is generated. Data needs to be captured more frequently to ensure not relying in old data.
- Variety = the different types of data (unstructured, semistructured, structured data), different forms of data (tweets, videos, process data). Affects how easy/difficult the data is to be managed and used.
- Veracity = uncertainty of data, how reliable data is. The explanatory power of the data increases if different data sources delivers similar results, but analysis can provide odd results also if wrong connections are identified.

Problem 4 (7 points)

- a) The same measurement unit is used for capacity requirement and production volume. All products have the same capacity requirement with this method if not manage to use a measurement unit (e.g. weight, volume,...) that differentiate capacity requirement per product. Pp. 293-296 (Jonsson & Mattsson) (2p)
- b) Simple and easy, capacity bill logic, low accuracy short term,...pp. 296-300 (Jonsson & Mattsson)
- c) Separates requirements from planned and released orders. Planned order data comes from MRP. Pp. 302-307 (Jonsson & Mattsson).

Problem 5 (7 points)

- a) MRP directly because seasonality is considered in the future gross requirement per period. Re-order point does not consider seasonality if not changing re-order point values. Run-out time planning have some dynamics built in as the requirements are lower in low volume periods. Could also change parameter value in the same way as re-order point systems.
- b) MRP can be used as a time-phased order point system or the logic be used in DRP. Re-order point systems used as independent/decentralized systems (not able to coordinate from a network perspective). Run-out time planning also used as independent/decentralized systems but could be used for centralized fair-share allocation in distribution networks.
- c) MRP generates future planned orders and therefore can be used to generate delivery schedules to suppliers. Run-out time planning and re-order point systems are not generating information about future planned orders and cannot generate delivery schedule information. Priority numbers (in run-out time planning) and double re-order point logics could be used to generate announcements of expected future order.

Problem 6 (7 points)

- a) The information to answer this question is available in the Jonsson & Mattsson textbook, on pages 350-356. The following contents should be included in the answer:

Order release from planned start times: capacity is not considered

Regulated order release: Capacity is considered. Workload is smoothed by the rescheduling of orders if capacity is exceeded, i.e. orders are moved backwards or forwards in time. Advanced system support is a prerequisite.

Input/output control: Capacity is considered, but in a simpler manner than with the regulated order release. The sizes of the queues (or no. of orders in the workshop) are considered and are kept on a predetermined level (or within a predetermined span).

- b) Typical characteristics of environments are described in the textbook (Jonsson & Mattsson) on page 352 (order release from planned start times), page 354 (regulated order release), and page 356 (input/output control), respectively.

Problem 7 (8 points)

- a) The answer should explain how short setup times are a prerequisite for small batch sizes, which in turn are in line with the strive towards efficient flows. The relations to production smoothing, levelled production and short lead times should also be pointed out.
- b) The answer should point out that CONWIP is based on generic signals, as opposed to regular kanban signals, which are item-specific. Hence, regular kanban systems are designed to handle only very moderate variations in volume for each item. (Here, a reference to the kanban formula could be made.) With generic signals, variations within items can instead be handled.
- c) The answer should explain that a kanban board is used to collect cards before initiating production. The board reflects the batch sizes in production and shows priorities between different items. The visualising function of the kanban board should be pointed out.

Problem 8 (9 points)

c)

Percentage of demand during lead time:

Advantage: Easy to understand. Doesn't require information about standard deviation in demand.

Disadvantage: Does not consider differences in variation in demand. Is not possible to relate to some kind of targeted service level.

Cycle service:

Advantage: The safety stock is possible to relate to variations in demand and to a targeted service level. Means somewhat easier calculations than the fill rate service.

Disadvantage: Does not consider number of replenishments per year which means that low volume items will be favored on the expense of high volume items. Big difference between the cycle service measure and order line fill rate measure which is the most commonly used measure when measuring actual service levels.

Fill rate service:

Advantage: The safety stock is possible to relate to variations in demand and to a targeted service level. Reflects the number of replenishments per year. Is more aligned with the performance measure order line fill rate typically used when measuring actual service levels.

Disadvantage: Somewhat more complicated to calculate than cycle service.