1. Role of the “deliberate strategy” in the operations strategy of a company is:

* To exploit opportunities emerging from the field in turbulent environment
* **To define a clear line to take many little good choices**
* To reach the gap with premium class competitors
* To define investment in new technologies

1. What are the service product characteristics?

* Simultaneity, Customer participation, Homogeneity, Perishability
* Perishability, Intangibility, Time consuming, Homogeneity, Customer participation, high fixed cost
* **Intangibility, Simultaneity, Heterogeneity, Customer Involvement in the service process, Perishability**
* Simultaneity, Heterogeneity, Invisibility, Customer involvement in the service process, Perishability

1. Considering a theme park service company, which of the following options could be considered an **outcome** of the company?

* Easy parking, lots of rides and fun time
* **Good food and 18 rides used**
* Food outlets, toilets and white knuckle rides.
* Helpful staff, never a dull moment and enjoyable attractions.

\*\*Considering a theme park service company, which of the following options could be considered an **Experience** of the company?

* Easy parking, lots of rides and fun time
* Good food and 18 rides used
* Food outlets, toilets and white knuckle rides
* **Helpful staff, never a dull moment and enjoyable attractions**

1. In **a multiple queueing system**, which are the benefits of **centralization of back- office activities**?

* Shortening of lead-time
* Increasing on flexibility
* **Higher specialization**
* Increasing customization

1. In a service company, which benefits does **centralization of back-office activities give (Pros)**?

* Shorter lead-times.
* **Less volume variability.**
* Activities overlapping.
* Greater Flexibility.

1. In the service industry, the level of satisfaction of a customer has been defined

* By the experience.
* As the difference between the expectation and the service price.
* **As the difference between perception and expectation.**
* By the experience of the outcome.

1. Which characteristic belongs to a professional service shop compared to mass service?

* More attention to quality.
* **Request of knowledge sharing.**
* Less attention to cost.
* More product innovation.

1. Which characteristic belongs to a professional service shop compared to mass service –

* Attention to price
* **Attention to customer specific requirements**
* Attention to quantity
* Process innovation.

1. According to KDAM(Key Decisional Area matrix) , DHL transport services belongs to cluster

- Service project

**- Service factory**

- DIY service

- Service Partnership

1. How would you compute the variability?

* **The difference between the average value and the actual value.**
* The difference between the average value and the forecasted value.
* The difference between the average value and the forecasted value.
* The difference between the actual value.

1. How would you compute “uncertainty ”?

* The difference between the average value and the actual value
* The difference between the average value and the forecasted value
* **The difference between the actual value and the expected value**

1. With Pre-Shop-Pool and workload control planning, the company:

* Reduces setups
* Controls the production and reduces necessity of manpower
* **Reduces WIP and shop-floor time**
* Immediately releases production orders to shorten lead time

1. When orders in Pre-Shop-Pool reach the upper limit, the company should:

* **decrease order intake**
* foster sales
* decrease capacity
* selling shorter delivery time to customer

1. Investing in cross-trained employees supports company:

* Increase time-buffer for customers
* **Making capacity more flexible**
* Reducing demand variability
* Increase overall capacity

31. You are a manager of a restaurant; if your service process(output) is affected by uncertainty, which lever do you invest in ?

- Reservation system

- Training

**- Standardization of activities**

- Increasing employees participation in process improvement

1. Which characteristic belongs to a performance that is classified as Order Qualifier?

* If company’s performance improves, the company gains more order
* The performance defines the competitive advantage of the company
* **If company’s performance gets worse, the company loses order**
* Company’s quality performance is very good

1. Which characteristic belongs to a performance that is \*\*\*\*classified as Order winner?

* Company’s price performance is very good
* It is a company’s base level offering
* **The performance defines the competitive advantage of the company**
* If company’s performance gets better, the company orders remain unchanged

1. Which characteristics belongs to a performance that is classified as Order Loser?

* company’s quality performance is very good
* **company is excluded as potential supplier by customer**
* if company’s performance improves, the company has a competitive advantage against competitors
* the performance defines the competitive advantage of the company

1. Operations capabilities are classified as “Externally Supportive” if they

* hold the organization back
* are clearly the best industry
* **redefine industry expectations**
* are as good as competitors

\*\*Operations capabilities are classified as “Internally Neutral” if they

* **hold the organization back**
* are clearly the best industry
* redefine industry expectations
* are as good as competitors

\*\*Operations capabilities are classified as “externally Neutral” if they

* hold the organization back
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* redefine industry expectations
* **are as good as competitors**

\*\*Operations capabilities are classified as “Internally Supportive” if they

* hold the organization back
* **are clearly the best industry**
* redefine industry expectations
* are as good as competitors

1. In front of a theatre, 10 people are waiting for the hostess to be admitted to the show. In one minute she is able to check the ticket of the customer and admit him to the show. What is the distribution the best describes the service process in this situation?

- Normal

- Poisson

**- Negative Exponential**

- Standard Normal

35. Choose the only correct answer regarding the customer behaviour in a queuing system modelling.

- Balking is when a customer already in queue gives up the service and goes away without being served

**- Reneging is when a customer already in queue gives up the service and goes away without being served**

- Reneging is when a customer decides not to enter a queue because it’s already too long

- Rejecting is when a customer decides to exit the system because she doesn’t respect acceptance requirements

26. In a grocery store, there are 4 people waiting in line for the payment. There are 3  cash counters and the service rate of each cashier is 2 people every 10 minutes. The  clients are served by the two cashiers following a FIFO approach in one single line.  What is the queue configuration?

- MM4

- 3M/M/1

- **MM3**

- 3MM3

27. In a grocery, there are 5 people waiting in line for the payment. There are 2 cash counters, and the service rate of each cashier is 2 people every 10 minutes. The clients are served by the 2 cashiers following a FIFO approach in one single line. What is the queue configuration?

- 2 M/M/2

- 2 M/M/1

- M/M/5

**- M/M/2**

28. In a store there are 5 people waiting in line for the payment. There are 2 cash counters and the service rate of each cashier is 2 people every 10 minutes. Each cashier has its own queue. What is the queue configuration?

- 2M/M/2

**- 2M/M/1**

- M/M/5

- M/M/2

47. In a single queueing system, which are the benefits comparing it with multiple  queueing system?

**- Shortening of lead-time**

- Reduce the anxiety of customers waiting in line

- Higher specialization

- Increasing customization

82. For the passport control, Malpensa airport adopts a single queue configuration while Istanbul airport adopts multiple queue configuration. Considering the same number of servers, choose the correct answer.

- Malpensa's average throughput time is longer and no balking happens

- In either airports, no passenger enters and leaves without being served, but Istanbul's configuration scares passengers

- **Istanbul focuses more on improving customer perception while Malpensa focuses more on FCFS to try to reduce the overall waiting time.**

- Diversification of the service is more important for Malpensa than for Istanbul.

48. Which characteristic belongs to a single queue with respect to multiple queue?

- More service diversification

- More variability in the system

- Balking actions are less frequent

**Less variability in the system**

25. Choose the correct answer for M/M/C system

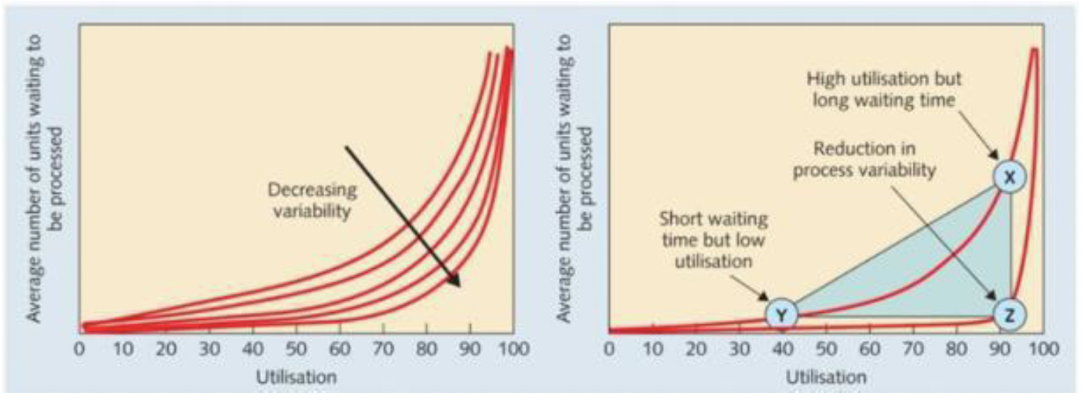
**- When system utilization increases for the same number of servers, the number of people waiting in queue increases**

- When system utilization increases for the same number of servers, the number of people waiting in queue decreases

- When system utilization increases for the same number of servers, the number of people waiting in queue remains the same

- When system utilization decreases for the same number of servers, the number of people waiting in queue increases

38. Chose the one correct answer regarding the graph with X being the AS-IS situation



-To move from X to Y, we want to reduce the average number of units in line, we should reduce the utilization rate by reducing the number of resources

**- Process variability results in simultaneous waiting and resources underutilization**

- In order to move from X to Z, we should reduce system variability by introducing more resources

- All the answers are correct

6. Esselunga, as per health guidelines, adopted an M/M/1 configuration for the waiting line outside the supermarket. How does the average throughput time of that system change when prioritizing over 65-year old over other customers?

- It decreases

- It increases

- It depends on peak times

**- It remains unchanged**

78. When introducing a priority of one customer typology over another, the throughput time of a system

- Increases only if non pre-emptive priority

- Increases only if pre-emptive priority

**- Remain unchanged**

- Increases regardless of priority type

51. In a bar, the barman is able to serve 2 people every 8 minutes. The arrival rate of clients has been estimated to be around 10 people every hour. Estimate the saturation of the barman.

- 0,5

- 0,2

- 1,5

**- 0,67**

ƛ= 1/6 = 0.167 customer min

μ= 0.25 customer/min

SR= ƛ/ μXc = 0.167/ 0.25 =

91. In a COVID testing clinic, a patient enters the waiting area then the testing area then the payment area. Which is the average number of patients in the clinic knowing that the average number of people in each of the areas are 2, 3 and 4 respectively?

- max of all Ls=4

**- Ls=2+3+4=9**

- Ls=2*3*4=24

- Ls=(2+3+4)/3=3

90. In a COVID testing clinic, a patient enters the waiting area then the testing area and then the payment area. How much is the probability of the system being empty knowing that the probabilities of each of the subsystems being empty are 0.1, 0.2, 0.3 respectively?

- P= max of all probabilities = 0.3

- P=0.1+0.2+0.3=0.6

**- P=0.10\*20\*3=0.006**

- P=(0.1+0.2+0.3)/3=0.2

36’’. If on average 100 c/hr enter a bar, then 10 c/hr leave and go home, and the rest enter the restaurant and after lunch go home. What is the adjusted occurrence of the path of people entering both the bar and the restaurant?

* 0,1
* **0,9**
* 1
* we need more information

Occurrence = O/P/I/P = 90/100 = 0.9

38’’. The ride to the tallest building in the world, Burj Khalifa tower in an elevator takes 38 seconds, before you are able to enjoy the view. Engineers studying the queuing management suggested introducing a video projection inside the elevator.

* The video has the same function as a waiting line in a queuing system.
* Customers will be distracted by the video and perceive longer ride
* **The video has the same function of magazines and journals in a medical doctor waiting room.**
* The video has no purpose related to Queue management.

34. When you introduce the "overbooking" and you need to estimate the protection level of full price customers, you have to first estimate the cost of underestimation and cost of overestimation. On what type of customers do you compute the marginal analysis?

- Both the cost of overestimation and cost of underestimation are computed on no-show customers

**- Both the cost of overestimation and cost of underestimation are computed on full price tickets customers**

- The cost of overestimation is computed on full price tickets customers while the cost of underestimation is computed on discounted price tickets customers

- Both the cost of overestimation and cost of underestimation are computed on discounted price tickets customers

1. How would you define the Heuristic ESMR method EMSR ( Expected Marginal Seat Revenue) ?

* An iterative method used to set the right overbooking strategy by appropriately allocating the available capacity whenever there are more than two classes of customers. The computation starts from the cheapest class
* **An iterative method used to maximize the profit by appropriately allocating the available capacity whenever there are more than two classes of customers. The computation starts from the most expensive class.**
* An iterative method used to maximize the profit by appropriately allocating the available capacity whenever there are only three classes of customers. The computation starts from the most expensive class
* An iterative method used to maximize the profit by appropriately allocating the available capacity whenever there are only three classes of customers. The computation starts from the cheapest class

36. Choose the correct sentence:

- The no-show phenomenon cannot be managed with the overbooking.

- The no-show phenomenon characterises only full price customers.

**- The no-show phenomenon could characterise both full and discounted price customers.**

- The no-show phenomenon characterises only discounted price customers.

39. Choose the one correct answer:



**- Protection level of full price tickets is necessary to avoid cannibalization from discounted price tickets to ensure profit maximization and cover all the seats available.**

- In order to maximize my revenues, it is more convenient to sell all tickets to low cost passengers as I am sure they will buy them all

- Protection level of discounted price tickets is necessary to avoid cannibalization from full price tickets

- Having fixed capacity of event’s seats, we should start selling full price tickets to ensure profit maximization and cover all the seats available

67. Which of these sets of characteristics represent the ideals for yield management?

- Variable capacity, perishable inventory, low capacity-change costs, and product booked in advance

- Fixed capacity, perishable inventories, low capacity-change cost, and ability to segment markets

- Perishable inventory, high capacity-change costs, product sold after its use and fixed demand

**- Fixed capacity, perishable inventory, high capacity-change costs, ability to segment market, fluctuating demand and products booked or sold in advance**

68. Which of the following system characteristics make YM Yield Management not useful?

- Possibility to buy/book in advance the product/service

- Products are perishable

**- System’s variable capacity**

- There are different types of customers (segment

69. Which type of company can benefit from implementing yield management?

- Only companies that provides a service to customer

- Companies belonging to specific industries that have fixed capacity and want to maximize their profit

**- Any kind of companies able to segment the segment the market, that have fixed capacity and perishable inventory, high capacity change cost, uncertain demand and the possibility to sell/book product in advance**

- Only service companies able to segment the segment the market, that have fixed capacity and perishable inventory, high capacity change cost, uncertain demand and the possibility to sell/book product in advance

70. Inserting a last-minute ticket, a company adopting yield management

**- Increasing the protection level**

- Decreasing the protection level

- Increasing both protection level and seats for discounted rate

- Not impacting on protection level

37. Choose the only correct answer

- Cost of underestimation includes the lost revenue associated with reserving too few seats as discounted fare (underestimated demand)

- Cost of underestimation includes the cost of reserving too many seats at full fare (overestimated demand). As if the empty full-fare seat could have been sold at the discounted price

**- Cost of underestimation includes the lost revenue associated with reserving too few seats as full fare (underestimated demand)**

80. For a local flight in italy one can buy a 14-day advance purchase fare for only 49 euro; the regular full price for local flight is 60 euro. On average all type of passengers buy directly on the flight a brioche that costs 3 € and coffee for 2 €; choose the correct answer:

- Co = 49+2+3 = 54

**- Co = 49**

- Co = 49-2-3 = 44

- Co = 49-2+3 = 50

Co= 3+2+(49-3-2) =49

81. For a local event, one can buy a 20-day advance ticket for only 50€. The regular full-fare price for the ticket is 70€. Participants of the events will be offered a buffet for 20€ per person, the dinner expenses are provided by a local sponsor

**− Cu= 70-50=20**

− Cu=70-50-20=0

− Cu= 70-50+20=40

− Cu=70

79. An apparel shop wants to determine by ym the number of dresses to be ordered for the next season collection. Consider that dresses ordered but not sold at the end of the season are all sold by lowering the price by 50% from 400 €/pc to 200 €/pc (the purchase costs 250 €/pc), which value is p(x<s)?

- 0,33

- 0,67

- 0,5

**- 0,75**

Cu = 400 -250 =150

Co = 250-200 = 50

p(x<s) = Cu/ Cu+Cu = 150/ 200

92. Calculate the revenues of an event knowing that it can hold up to 500 participants, Full price = 200 euros, Discounted price = 100 euros, PL = 240, and full price ticket holders get to have as a gift a gadget at the day of the event that costs 15 euros.

**- R= 200X + (500-240) \*100**

- R=(200-15)\*X + (500-240)\*X

- R=200\*240 + 100\*(500-240)

- R=(200+15)\*X + (500-240)\*100

12’’. Calculate the Costs of an event knowing that it can hold up to 400 participants, Full price=300€, Discounted price=200€, PL=240, a gadget that cost 20 € for all participants paid before the event and 70% of full price ticket holders will have a dinner at the day of the event that costs 50€.

- C=20\*400+0.7\*50\*240

- C=20\*400+0.7\*50\*(400-240)

**- C=20\*400+0.7\*50\*X**

- C=20\*400+0.7\*50\*(240-X)

93. knowing that the probability to sell a number of tickets for a gala dinner less than 190 equals to 80% and the demand is described by a normal distribution with mean 150 and Z=1.25, how much is the standard deviation?

− σ =152

**− σ =32**

− σ =120

− σ =0.2

Z= X-μ/σ

σ (190-150)/1.25

27’’. Italian airline is adopting 3 classes, Premium rate for 1000 €, executive rate for 800 € and economy rate for 500 €, with a protection level of 150 seats. The company decided to adopt the economy rate as a last minute price ticket. What would happen to the protection level?

**- Increasing the protection level**

- Decreasing the protection level

- Increasing both protection level and seats for discounted rate

- Not impacting on protection level

1. In HQ case, on which performance does the choice of investing in a small number of big machines impact?

* higher quality of design thanks to better setting of machines
* lower flexibility of plan thanks to lower number of required setups
* **higher speed (time) thanks to shorter cycle time**
* higher price thanks to low number of employees needed

1. In the HQ case, which lever should you implement in order to improve flexibility performance?

* Increase automation grade in order to produce faster.
* Launch production of big batches in order to reduce setups
* **Split production capacity in larger number of machines**
* Increase capacity saturation

1. In HQ case, which are the most significant performance to compete in the new market ?

* **Time (speed), flexibility ( product and plan), quality of design**
* Time(speed), price and flexibility(variety)
* Quality (conformity) and time (delivery reliability)
* Price and quality of design

1. In the HQ case, which is the most significant performance to compete the consolidated market?

* Time (speed)
* **Price**
* Quality (design)
* Quality (conformity)

1. In the HQ case, which of the following is not consistent decision according to the consolidated market

* Meeting the demand according to MTS logic
* Customer base made of few big customers
* **Incentives system based on quality conformance and delivery speed objectives**
* Work procedures strictly recommended

1. In the HQ case, which of the following is not a consistent “structural choice” according to the new market?

* Mono-impression moulding in order to ensure lower setup times.
* Increasing the production capacity in order to absorb demand variability.
* **Small number of big production machines in order to ensure machine saturation.**
* Low automation grade

1. In the HQ case, which lever should you implement in order to improve cost performance?

* Increase capacity in order to absorb variability through extra-capacity
* Split production capacity in many small machines
* **Launch production of big batches in order to reduce setups**
* Decrease automation grade

1. In the HQ case, why is it good choice for the new market to have extra-capacity?

* because it allows to overproduce and so to have stocks to absorb peaks of demand
* because it impacts on product quality and so on customer satisfaction
* **because it allows to absorb possible fluctuations in demand volume without using stocks**
* because it allows to exploit economies of scale

1. In the new market for HQ

* customers require a large variety of products so then after-sales service is required to assist clients.
* **customers require a large variety of products so then variety and flexibility performance play a key role.**
* customers require a small variety of products that are ordered in advance.
* customers require a small variety of products so the focus is on product flexibility.

71. For the Shouldice hospital, which are the drawbacks of opening a second clinic (even outside Canada)?

* **The difficulties of replicating the same concept, especially for what regards soft elements( bond among doctors and staff, relationship with patients, and the standard procedure of hernia surgery)**
* The difficulties of replicating the same concept, especially for what regards hard elements( patients rooms, stairs, surgery rooms with U shape …).
* The difficulties in guaranteeing the same duration and predictability of hernia surgeries.
* The difficulties in hiring new doctors and staff

72. For the Shouldice hospital, which are the drawbacks of opening on Saturday ?

* There are no drawbacks for this solution, and therefore is the one applied by Shouldice hospital
* Clients are not satisfied because the service provided is not exactly equal to the one provided during week
* **Lower bond among doctors and staff, because there was the creation of two sub- groups ( one working only during weeks and one working also on Saturdays) and service provided on Saturdays not exactly equal to the one provided during week**
* Not enough rooms available to guarantee 4 days of patients recovery, therefore the solution is not applicable.

73. Shouldice Hospital plays mainly on 2 levers to provide customers with such a high well- recognized value. Which are them? (PRICE IS NOT A LEVER)

* **High specialization (only one surgery) and high competences of its own employees**
* High specialization and low price
* High competences of its own employees that enable Shouldice to deliver above- average quality
* Low price and competences of its own employees

74. Shouldice Case represents a “best practice” of alignment between market and operations. How is its concept built?

* **The concept of Shouldice hospital is based on both outcome and experience provided to the patients.**
* Shouldice hospital built its concept on the outcome, namely the high success rate in the hernia surgery
* Shouldice hospital built its concept on the short and predictable time required to patients to recover from hernia surgery
* The concept of Shouldice hospital is based on the low price for hernia surgery compared to competitors

75. Which managerial and organizational elements strengthen the concept of Shouldice?

* **Presentation on the surgery held by the medical staff to patients and the possibility for the patients to meet both employee and other patients in the canteen to share experience**
* Making patients wait a long time before being accepted by the hospital (long queue) in order to make them aware of the value of the service provided
* Being able to provide the hernia surgery in the day hospital (short and predictable time)
* Frequent interviews to patients not satisfied by other hospitals in better defining operations

76. Which structural elements strengthen the concept of Shouldice?

* Surgery rooms with U shape which reinforce the teamwork concept among medical staff
* **Double rooms for patients, meeting rooms (as tea room or Tv room) and meetings with employees and patients within the canteen**
* Special stairs, designed ad hoc, which enable patients to recover fast from the hernia surgery.
* Double rooms for patients, meeting rooms (as tea room or TV room), special stairs, surgery rooms with U shape( as manufacturing cells)

77. Shouldice hospital is facing an increase in demand that is not able to fulfil with the actual capacity. Which are the possible alternatives?

* Having a mismatch between demand and capacity is done on purpose, so thus no alternatives are evaluated.
* **Extending the doctors working hours or working on saturdays with already existing staff or opening a second clinic (even outside Canada).**
* Increasing the internal capacity (extending doctors working hours, opening on saturdays, hiring new doctors), opening a second clinic (even outside Canada) or starting a collaboration with other clinics.
* Hiring new doctors and staff to increase the internal capacity of the hospital

1. "Station 1, 2 and 3 are part of the same line and they are decoupled by stocks, given the following data, indicate the correct answer: Ta= 20h/day, Cycle time (station 1)=22 s/piece, Cycle time (station 2)=25 seconds/piece, Cycle time (Station 3)=24 s/piece, Availability 90% for station 1 and 100% for the others "

* **The daily production capacity is 2880 pieces/day**
* The daily production capacity is 3000 pieces/day
* The daily production capacity is 2945 pieces/day
* All the answers are wrong

7’’. Which one of the following statement is false considering the daily production capacity of **a coupled system**.

* It is affected by the product of the availabilities of all the stages that compose the system
* **It is always lower than the daily production capacity of a decoupled system**
* It is computed considering the maximum change over time
* It is computed considering the maximum cycle time

1. Consider a manufacturing company producing shirts and define which activity is value adding

* Perform a quality control on the colour of the shirts before delivering them to the customers
* **Sew the buttons on the shirts**
* Bring the toolkit to the right place
* Clean the stations

1. Considering a manufacturing company producing machine tools and define which activity is value adding:

* Test a product before sending it to the customer
* **Inserting a ball shift on its shaft**
* Bring electric motors from the warehouse to the place where machine tool is assembled
* Plan internal and external operators’ activities for the next week

1. Which is the longest time in an operations system?

* Throughput time
* Value adding time
* **Lead time**
* Not-value adding time
* Cycle time

1. Which is the shortest time in an operations system?

* lead time
* **Value adding time**
* throughput time
* not value adding time

24. Which of the following sentences about the future state map is wrong?

* The aim of the future state map is to reduce the overall process lead time of the company
* **Once you draw the current state map, you must find improvements area and then draw the future state map. It exists only one future state map for each current state**
* You need to define(1) material flow, (2) information flow and (3) timeline
* The aim of the future state map is to couple all production stages. If you are not able to do so, you can decouple stages with supermarket pull system.

1. Imagine that you have a production process where there are two parallel flows (press and cutter). What will you consider for drawing your timeline?

* **I will compute the overall time length of both paths, once passing through the press and once passing through the Cutter. I will consider the longest path for my timeline (in terms of stage, as well as of upstream and downstream supermarkets).**
* I will consider for my timeline the longest CT for the two parallel stages while for the downstream supermarkets, the one with higher number of stocked pieces.
* I will consider for my timeline the stage with the highest EPE.
* I will consider for my timeline the shortest CT for the two parallel stages while for the downstream supermarkets, the one with lower number of stocked pieces.

1. Shotter Spa produces pencil and works with 2 shifts ( Ta=900 min/day). The average demand is 300 pencil/ day. There are two production stages, both fully dedicated and with availability of 100%: P1( CT= 30 sec/ pencil; CO= 5 min/ setup and P2( CT= 25 sec/pencil; CO=0 min/setup). Which is the Minimum Batch size for the company?

* **MBS= 2 pencil/ batch**
* MBS= 150 pencil/batch
* MBS=unitary batch
* It depends on customers’ requests

1. Schnay company produces only standard products and has an EPE equal to -0,76 days. Which indication does the company take?

* Schnay company is able to produce the whole volume but not the mix
* Schnay company needs SMED to reduce setup time
* **Schany company has not enough capacity to fulfil demand volume**
* Schnay company is sure to reproduce both volume and mix required by customers

1. The assembly stage of Ryccar Spa company process **5 variants** of bikes and works 1350 min/day. Average demand is equal to **50 bikes/day.** Assembly sage is fully dedicated, and its availability is 75%. Cycle time to assemble bikes is 18 min/bike. Assembly stage requires a setup every time the variant changes. Changeover time is equal to 35min/setup. Which of the following EPE for the assembly stage is the correct one?

* **1.16 days**
* 0.38 days
* 1.45 days
* 0.79 days

1. Bendys Spa is a MTO company. Production process is made by 4 stages with the following EPE values: EPE(S1)=3.15 days; EPE(S2)=0.16 days; EPE(S3)=0; EPE(S4)=1.14 days. Which is the time period necessary to Bendys Spa to produce the whole mix and satisfy required by the customers?

* **3.15 days**
* 1.14 days
* It depends on the amount of stocks and raw materials
* 1.1125 days

1. Sailor spa production process is made by 5 stages with the following epe: epe(s1)=2,14 days; epe(s2)=0 days; epe(s3)=2,51 days; epe(s4)=1,42 days; epe(s5)=0,66 days. Which is the frequency according to which sailor spa is able to produce the whole volume and mix required by the customer:

* **Every 2,51 days**
* Every 1,346 days
* It depends on the volume & mix required by the customer.
* Every 0,66 days.

1. Cargo spa produces glasses (d=1000 pieces/day) and it wants to have at maximum 5000 pieces/supermarket. With which frequency the supplier should deliver raw material

* Every 5 day
* Every 3,33 days
* Twice a day
* **Twice per working week (week = 5 days)**

1. Linus company works for 900 min/day and the daily demand of product family “a” is 2000. The packaging department is dedicated to the product family a and it is able to pack the product **in 12 different colours**. The cycle time of this stage is 20 sec while the time to change the colour of the packaging takes 4 minutes. The department is 100% available. Estimate the epe of the packaging:

* **0,206**
* 0,052
* -0,403
* 1,234

1. PDCA is a methodology for:

* **adopting scientific approach in problem setting and problem solving**
* reducing level of stocks in production department
* optimizing space occupied in assembly line
* reducing time for implementing new solutions

1. Rank order clustering is a lean practice for:

* Reducing set-ups
* Identifying wastes
* **Defining product families**
* Creating the pull

1. The impact of Heijunka box is of

* Creating continuous flows
* **Reducing bullwhip effect**
* Increase safety stocks
* Reducing setups

1. DECAF conditions analysis supports managers in

* Increase availability of a cell
* Defining optimal level of stocks
* Improving planning of production
* **Understanding gap for creating continuous flow**

1. Considering a production line, if you want to improve flexibility of planning, which lean technique do you execute?

* 5S
* Kanban
* **SMED**
* Value Stream Mapping

1. During SMED

* Internal activities are moved to the beginning or to the end of setup produce
* Products are batched in order to reduce setups
* **External activities are moved to the beginning or to the end of setup procedure**
* Setup activities are automatized

1. With Pre-Shop-Pool and workload control planning, the company:

- Reduces setups

- Controls the production and reduces necessity of manpower

**- Reduces WIP and shop-floor time**

- Immediately releases production orders to shorten lead time

59. When orders in Pre-Shop-Pool reach the upper limit, the company should:

* **decrease order intake**
* foster sales
* decrease capacity
* selling shorter delivery time to customer

8. Which is the most probable decision you can find if a company decides to drive digital transformation through lean principles:

- IoT for making data available to operators for taking decision

- Supplier visibility on forecasts, orders and inventories in order to anticipate stock- outs

**- Investments in real time scheduling**

- Automations in order to exploit new technologies for increasing capacity

13. Which is the most probable decision you can find if a company decide to drive digital transformation through lean principles:

- Automations in order to exploit new technologies for increasing capacity

- HMI technologies in order to improve flexibility of operators

**- RFiD technologies in order to track real time product status**

- Machine learning for planning in order to reduce number of setups

1. Lean organizations are characterized by

* **Flat organization composed by many small teams, high level of power delegation to people**
* Hierarchical organization composed by few large teams, low level of power delegation to team officers
* Flat organisation composed by few large teams, high level of power delegation to team officers
* Hierarchical organization composed by many large teams, low level of power delegation to people.

11. Lean Innovation concepts drive R&D teams to tackle wastes in order to

* Reduce time necessary to perform market research
* **Reduce time devoted to product features not desired by customers**
* Reduce time for finding new customers
* Execute many projects simultaneously

12. Considering an R&D department led by Lean Innovation concepts, which is the most probable context you can find?

* Function Pushing for perfect learning cycle, launching product on the market only when all the features are completed
* **Function Pushing for fast learning cycle through many small iterative projects**
* Function Pushing for fast learning cycle with very big teams in order to have more resources on the same projects
* Teams working at the same time on more projects in parallel

53.Usually, comparing SES company with a traditional company, SES company has

* Higher fixed cost and higher price
* Higher fixed cost and lower price
* **Lower fixed cost and lower price**
* Lower fixed cost and higher price

5. What are the benefits of small scale capacity increments compared to big scale increments?

* **Financing availability**
* Economies of scale
* Over utilization costs
* None of the answers

4’. In the cutting stage is a cell where currently there are 4 operators employed to perform four different manual tasks which take respectively 7 min, 4min, 6min and 4min. The cutting stage is based on 3 shifts of 8hours each. The product daily demand is 200 pieces. Determine whether the number of operators can be reduced in order to save a resource for other value-added activities

* **The cell needs 3 operators to address the overall work-content. The fourth operator can be**

**employed in another stage**

* The cell needs all the 4 operators to address the overall work-content
* Only 2 operator are necessary to address the overall work-content
* The cell requires 4 different operators to address each of the four activities

TT= Ta/ Demand = 3x8x60/200 =7.2 min/pc

# of Operators = WC/TT = (7+4+6+4)/7.2 = 2.9 = 3 Operators

5’. Lean and digitalization

* Successful companies digitalise their processes and they implement Lean to improve them
* Companies that deeply embrace digitalisation, do not need lean management
* Companies that deeply embrace lean management do not need digitalisation
* **Successful companies adopt lean management before digitalising their processes**

7’’. Which one of the following statement is false considering the daily production capacity of **a coupled system**.

* It is affected by the product of the availabilities of all the stages that compose the system
* **It is always lower than the daily production capacity of a decoupled system**
* It is computed considering the maximum change over time
* It is computed considering the maximum cycle time

17.Which one of the following statement is true considering the daily production capacity of a decoupled system

* It is affected by the product of the availabilities of all the stages that compose the system
* It is determined by the stage that has the slowest cycle time
* **It is determined by the stage that has the lowest expected output**
* It is determined by the stage that has the worst availability

8’. Company-A produces valves and is performing for time delivery an average of 20 days. Most part of competitors delivers as 12 days. The market requires 40 days for time delivery. Valves are sold to industrial plant producers, an industrial plant on average takes 4-6 months for being designed and 6-9 months for being completed.

* Company-A should hurry on improving time delivery performance for grasping market share to competitors
* **in the current condition, time delivery is not a significant KPI for increasing competitiveness of Company-A**
* time delivery is a competitive advantage for Company-A
* time delivery is a competitive advantage for competitors

9.Value adding energy in a machining process of a machine tool (e.g. a lathe) processing 100 pieces of Item AZ123 is:

* **The energy consumption of the machine tool from the moment it starts processing the first piece to the moment it finishes processing the last piece**
* The energy necessary to detach the excess material compared to the final shape, breaking the

chemical bonds among among athoms of the removed part and the athoms of the remaining part

* The energy consumption of the machine tool from the moment it finishes processing the previous

item to the moment it finishes processing the last piece of the AZ123 item

* The enery consumption of the machine only during the time it is removing material

10.Company-A is a system integrator and is performing for time delivery an average of 12 days . Most part of competitors delivers as 15 days. The market is evolving and requires 10 days for time delivery. Integration are sold to industrial machine producers, an industrial machine on average takes 2 weeks for being designed and 1 month for being completed.

* **Competitors should hurry on improving time delivery performance for grasping market share to Company-A**
* Company-A is in a safe position because Company-A delivers faster than most part of competitors.
* in the current condition, time delivery is not a significant KPI for increasing competitiveness
* time delivery is a competitive advantage for competitors

11.Which one of the following statament is false considering the batching

* Batching is necessary when it is not possible to produce the entire range and quantity of products as

requested by the customers in the time available

* **The lower the batch size is and the lower is the number of different variants to deliver to the**

**customers**

* In a decoupled system each stage has its own batching only depending on the change over of the

stage itself

* Batching is a waste since it means anticipating the production of final demand that is not requested -

overproduction.

14.There are two viewpoints to look at while studying a production process, Namely workcontent and workpace. Which of the following sentence is true?

* The workcontent depends on the number of operators.
* The workcontent for each production stage is computed looking how frequently a piece exit the

specific production stage.

* **In the value stream map, in the timeline it is correct to put the workcontent.**
* In the value stream map, in the process box it is correct to put the workcontent.

16.In the cutting department, there are two operators working in parallel with a CT=14 min/piece. The department works 1 shift per day (Ta=480 min/day). Change over time is 5 min/setup and availability is 100%. Which of the following sentence is correct?

* EPE>= (5 min/setup \* #setups)/(480 min -14 min/piece\*D)
* EPE>= (2,5 min/setup \* #setups)/(480 min -7 min/piece\*D)
* **EPE>= (5 min/setup \* #setups)/(480 min -7 min/piece\*D)**
* EPE>= (2,5 min/setup \* #setups)/(960 min -14 min/piece\*D)

19.The JOY srl operates in the agri-food industry and it is specialized in biological products characetrised by high obsolescence levels. The demand is characterised by fluctuation and it is not easy to predict. What would JOY have to go for between direct shipping and finished good warehouse?

* **Direct Shipping**
* Finished Good Warehouse
* Choose both We need information on customers and suppliers to decide

23.Lean and radical innovation

* Lean is continuous improvement and cannot be adopted in radical innovation
* **Radical innovation can benefit from Lean aspect of reacting to events rather than focusing of**

**anticipating them (test ideas on the market and make adjustment)**

* Lean is used after a radical innovation to fine tune the product or process
* Lean is based on radical innovation

24.A useful model for improving Planet conditions is to make a better use of

energy by critically analising the present use by analysing the following aspects:

* **Transformation; Distribution; Use**
* Transformation; Distribution; Purchase; Use
* Price; Distribution; Use
* Supplier; Price; Distribution;

25.Value Stream Mapping is used to map:

* Time only
* Time and number of pieces in queue only
* Time but also other scarce resource as water or energy
* **Cycle time and processing time**

26.The M&M company, which works on 3 shifts of 6hours/shift each, has a cell in which are now employed 3 operators. The operators perform manual tasks in order to produce product A, which daily demand is 100. In the cell, three main activities are performed which take respectively 5 min, 10 min and 3 min. Determine whether the number of operators can be reduced in order to

save a resource for other value-added activities

* The cell needs 3 operators to address the overall work-content
* **The cell needs 2 operators; thus 1 operator can be employed in another department**
* 3 operators are necessary to cope with the 3 different activities
* The cell requires only 1 operator

TT=Ta/ Demand = 3x6x60/100= 10.8 mins/pc

# of Operators = Total WC/TT = (5+10+3)/10.8 = 1.6 = 2 Operators

30’.The assembly stage of a company is composed of three operators that work On parallel. Each operator performs the whole assembly of the components to produce the final product. The whole assembly process takes 100 minutes. Which one of the following statement is false?

* The cycle time of the assembly stage is 100/3 minutes
* The total workcontent to produce 10 final products is 1000 minutes
* **In the timeline of the VSM currrent State the VA time is 100/3 minutes**
* In the timeline of the VSM currrent State the VA time is 100 minutes

If a production stage has an EPE equal to 3 days, having a total number of different item to process equal to 6, which is the correct following:

* **The customer has to wait 3 days for the 6 items**
* ﻿﻿The production stage needs 2 days to produce the items
* ﻿﻿The production stage could perform 6 set ups every day
* ﻿﻿The production stage works with a batch size equal to 2 pieces

13. The role of the Pre Shop Pool is to:

* Protect the production stages from the variability coming from the supplier's deliveries
* Level the product volume and mix at the Hejunka box
* Level the product volume and mix at the finished good warehouse
* **Protect the production stages from the variability coming from the customer's demand**

Hag Spa produces valves and works with 3 shifts (a=1080 min/day). The average demand is 500 valves/day. There are two production stages, decoupled by stocks. The first stage availability is 60% while the second has an availability equal to 100%. Cycle time on the first stage is 30 min/valve while on the second stage 60 min/valve. Which is the production capacity of the decoupled line?

* 1,25 valves/hour
* ﻿﻿2 valves/hour
* ﻿﻿**1 valve/hour**
* 1,2 valves/hour

What is the difference between Cp and Cpk?

* There is no difference if tolerances
* Cok is used when the process is centered
* Cp is more strict than Cpk
* **Cp is used when the process is centered**

Observing the output of a system there is always variability:

* **Common causes are the ones that are managers' responsibility**
* ﻿﻿Common causes are the ones that it is key to eliminate
* ﻿﻿Common causes are the ones that are indicating that the product is out of specifications
* ﻿﻿Common causes are the ones that are employees' responsibility

To level the mix means:

* Produce all variants in a fixed sequence that minimizes the overall setup time
* Produce the same quantity for each of the product variants
* **Produce on a very short time frame all Variant in the same proportion as the average demand**
* Produce all variants in a fixed sequence that minimizes the overall production time

Sampling the output of a system and considering the average value of a selected performance:

* The average of the averages of the samples follows the same distribution as the overall population
* ﻿﻿The average of the averages of the samples follows a normal distribution when the sample size is small
* **The average of the averages of the samples follows a normal distribution when the sample size is large**
* ﻿﻿The average of the averages of the samples follows a normal distribution

10. The FIFO line represents

* The only decoupling method you find in MTO companies
* A lean push tool
* **A lean pull tool**
* A queue of items whose obsolescence risk is very low

11. Cutting in half setup time (resource stop time) and batch size on a resource, causes the following direct effect/effects:

* All of the effects above
* **Decreases average inventory level and reduces response time of the resource**
* Increases quality conformance
* ﻿﻿Decreases average inventory level

1. Scrum is a technique of the Agile approach

* Particularly suitable for situations with very well defined and stable specifications, so that the sw is faster to develop and test
* Particularly suitable for high risk situations (e.g. the sw for safety control of a nuclear reactor)
* Particularly suitable for sw handling aspects of Authority regulation (e.g. the sw to test gas meters)
* **Particularly suitable for situations with not well defined nor stable specifications, and fast changing environment**

4. What are the goal of Lean Management ?

* Reduce inventory
* **Foster improvement**
* Increase delivery speed
* ﻿﻿Reduce waste

5. What is the main focus of Six Sigma

* Increase efficiency
* Increase timeliness
* ﻿﻿Increase accuracy
* **Decrease variability**

14. Sampling the output of a system and considering the average value of a selected performance:

* The variance of the averages of the samples is bigger than the variance of the population
* **The variance of the averages of the samples is the same as the variance of the population**
* The variance of the averages of the samples is smaller or larger depending of the type of distribution of the population
* The variance of the averages of the samples is smaller than the variance of the population

Which one of the following statements concerning the Lean concept of Mura is false:

* It is linked to queues
* It affects WIP level
* It is linked to the concept of variability
* **It is linked to waste hunting**

9. Which one of the following statements on Takt Time referred to a product family is true

* it is not affected by dedication parameter
* **it dictates the pace to the production flow**
* It is affected by change-over, downtime and the availability of the product family
* It is based on customer demand that is something that you can change

1. Considering Upper Control Limit and Lower Control Limit in the X control chart of a system:

* **There is no relationship between UCL/ LCL and customer specifications**
* When an observation is below LCL the unit produced is not meeting customer specifications
* When an observation is above the UCL the unit produced is not meeting customer specifications
* Customer specifications should be tighter than UCL/LCL

1. Improvement with innovation

* It requires a team dedicated to innovation
* **It holds big uncertainty about the achievement**
* ﻿﻿It takes long time to implement
* ﻿﻿It is infrequent

What are the “PROs” \_of leading strategy for capacity management?

* **Lower impact of unforeseen events and underestimating demand, spare parts capacity, better delivery reliability**
* Lower production costs, lower impact from overestimating demand, high plant utilization
* Lower impact of unforeseen events, high plant utilization better delivery reliability
* Outbound cash flow, higher impact from overestimating demand, higher production costs

What are the “PROs” \_of leading strategy for capacity management?

* - lower impact of unforeseen events and underestimating demand, spare parts capacity, better delivery reliability.
* - lower production costs, lower impact from overestimating demand, high plant utilization.
* - lower impact of unforeseen events, high plant utilization, better delivery reliability.
* **outbound cash flow, higher impact from overestimating demand, higher production costs.**

What are the “PROs” \_of lagging strategy for capacity management?

**- Lower impact from overestimating demand, low production costs and high plant utilization**

- Lower impact of uncertainty and unforeseen events and low production costs

- Higher impact from understanding demand, longer response time and lower delivery reliability

- Lower impact from overestimating demand, spare part capacity and faster response time