Course: Smart factories

Questions related to the content of first Interim exam

Question	Where to find answer: lectures, slides
What is the main challenge on the market that initiate the idea of Smart factory?	Introduction to Industry 4.0 Slide 4
What is Agile manufacturing, Agile production, What is important.	Introduction to Industry 4.0 Slide 5
What is the main goal in Smart factory in terms of agility, market demands? What should be the base (the principle of LEAN manufacturing, the use of digital technologies)	Introduction to Industry 4.0 Slides 6, 8, 10, 15
What the companies are looking for, their goals, what to improve within the processes?	Introduction to Industry 4.0 Slides 17, 18
What are the main technologies of I4.0, the main components of I4.0? Digitalization, Robotics, Sensorics, Digital twins, CPS, optimization through simulation, discrete event simulation	Introduction to Industry 4.0 Slides 23 to 29, short description of each technology, component Disciplines, systems and technologies for I 4.0 Slide 5, 6, 8, 9, 12
What will be for the factory of the future very important?	Introduction to Industry 4.0 Slide 32
What are the main steps to achieve active transformation of traditional factory towards the Smart Factory	Introduction to Industry 4.0 Slide 33, 34 , 50, 51
What could be the problem when operating with big and important data in smart factory, cloud approach, security.	Introduction to Industry 4.0 Slide 37
Why holistic approach is important when designing a smart factory (smart production, sustainability, impact on environment, urban production	Introduction to Industry 4.0 Slide 38
What is Smart factory, what are the functional levels. Definition of ERP, MES, MRP, PLM, etc.	Introduction to Industry 4.0 Slide 45 to 49, slide 52, 53 Definition of smart factory concepts Slide 18, 19, 22, 23, 24,

Question	Where to find answer: lectures, slides
What are the enablers of digitalization and I4.0 implementation?	Definition of smart factory concepts Slide 4
Explain the main difference between traditional and smart factory	Definition of smart factory concepts Slide 9 – 12, 14, 15
The working principle of Smart factory (from IoT, connectivity, data gathering and analysis, decision making and action execution)	Definition of smart factory concepts Slide 16
What are the future products, the products suitable for the smart factory?	Definition of smart factory concepts Slide 25
Explain the distributed structure in Smart factory in terms of architecture, connections, systems, role of employees	Definition of smart factory concepts Slide 26, 27, 28
What are the main components of Smart factory?	Definition of smart factory concepts Slide 29
What the digital supply chain involves, covers?	Definition of smart factory concepts Slide 30, 31

Question	Where to find answer: lectures, slides
What is the product structure (simple example, multi-level scheme)?	Product assembly Slide 10 - 13
How do you define the base part?	Product assembly Slide 15, 16
Why the digitalization of product structure and assembly process digital instructions are important for Smart factory, implementation of product and production management system	Product assembly Slide 18 - 24
What is the assembly structure? The diagram, the functionality, why we integrate the quality control and where?	Product assembly Slide 25 - 27
What is the main parameter of assembly operation? Time How can we define the operation, assembly time?	Product assembly Slide 28 Slide 33
What is total time and assembly cycle time? How can we reduce the assembly cycle time?	Product assembly Slide 29 - 31
What is balancing the assembly process? Distribution of operation to different assembly stations to achieve close to same time in all stations.	Product assembly Slide 32

Question	Where to find answer: lectures, slides
What are the new technologies in different domains, which one is the most important (virtual industrialization)?	Disciplines, systems and technologies for I 4.0 Slide 4
What is benefit of using simulation, digital twins? What can be the result? Different improvements!	Disciplines, systems and technologies for I 4.0 Slide 15 (examples: slide 16 – 21)
How can we implement digital twin approach to support traditional manufacturing (automation pyramid and digital twins)?	Disciplines, systems and technologies for I 4.0 Slide 25
Explain the main difference between off-line and real-time simulation (using of expert system for what?) it is possible to give you the scheme and you should describe the scheme.	Disciplines, systems and technologies for I 4.0 Slide 27, 28
What approach is the most suitable to integrate it in the simulation (Heuristics) and why is better compared to other exact numerical approaches?	Disciplines, systems and technologies for I 4.0 Slide 35
What are the trends in robotics? Grippers Machine vision as supporting subsystem AGVs, AMRs (what is the difference)	Disciplines, systems and technologies for I 4.0 Slide 45, 49, 53, 54, 60, 62

Question	Where to find answer: lectures, slides
The main difference between PULL and PUSH principle	PUSH, PULL Slide 2 - 8
How the PULL and PUSH is used in practice (can we use the combination)? What is used in Smart factory (PULL, KANBAN, JIT, LEAN, digitalization of processes)?	PUSH, PULL Slide 16, 18

Question	Where to find answer: lectures, slides
What is added and non-added value?	VSM Slide 3, 4
What is the main goal of LEAN? reduce eliminate waste, the list of wastes	VSM Slide 5, 6
What is VSM and what processes are involved? The entire value chain, flow evaluation	VSM Slide 13 - 16
What are the main steps of VSM, short description of each.	VSM Slide 19 – 23, 30 - 41
What are the main elements of VSM? You should know the symbols and draw a basic scheme showing the elements of entire supply chain.	VSM Slide 25 - 29