ZIP 2nd degree - field of study questions - Production Management

- 1. Discuss three decision-making levels in an organisation.
- Discuss a selected strategic environment analysis tool (for the committee: it can be SWOT, Porter's five forces or PERT).
- 3. Discuss the principles of creating and using BCG analysis results in strategic management.
- 4. Explain and justify the differences in the properties of amorphous metals compared to crystalline ones. Present applications for each property discussed.
- 5. Plasma characteristics and creation (mechanism). Present specific applications with the justification of plasma use.
- 6. Explain the properties of graphene. Discuss the problems associated with the production of a graphene layer.
- 7. Name three data analysis methods classified as supervised learning (learning with a teacher, supervised learning).
- 8. Name at least three methods of forecasting time series.
- 9. What is a time series? Give examples of production-related variables that are time series.
- 10. What is a regression model? Give an example of its use in production.
- 11. What is forecasting? What is the purpose of forecasting in production management?
- 12. Name at least five types of charts used in graphical data analysis.
- 13. Explain the meaning of the term layout, considering its dual nature. List the levels of layout planning.
- 14. List the most common reasons for starting design work on a new layout of workstations.
- 15. Name and discuss the application of at least four typical forms of production organisation, depending on the organisation of the workstation layout.
- 16. Present the advantages and disadvantages of production on production lines and characterise the production line in terms of process type, product, product demand, type of equipment, means of transport and method of storage.
- 17. Name and discuss at least five criteria for the optimal layout of workstations.
- 18. Name and discuss at least five guidelines for arranging workstations in a production cell.
- 19. Discuss the basics of object-oriented system modelling, explaining terms such as object, system, state, event, activity and process.
- 20. Define the term business process and characterise the difference between a map and a business process model.
- 21. Describe the IDEF0 modelling method and explain the definition of the ICOM cube.
- 22. Characterise the structural diagrams of the UML method using the class diagram as an example.
- 23. Characterise the behaviour diagrams of the UML method using the example of a use case diagram, states or activities.
- 24. Discuss the application of the BPMN method and briefly characterise the fundamental groups of symbols used in its notation.
- 25. Name and briefly explain three of the five points of design thinking.
- 26. Name and briefly explain the three fundamental pillars of Management 3.0.
- 27. Characterise product labelling methods.
- 28. Characterise tools for reading identifiers applied to a product.
- 29. Discuss the features and advantages of IT traceability systems.
- 30. Explain what conditions must be met for the IT flow control system to allow the production process to continue at the next stage of the product's technological route.
- 31. Name the scheduling criteria. Discuss a selected example of conflicting criteria.

- 32. Name the basic strategies of machine and equipment maintenance. Discuss one of them.
- 33. Discuss the key product design principles within the Design for Reliability concept.
- 34. Discuss the tasks of reliability engineering.
- 35. List the essential reliability characteristics of a system and discuss one of them.
- 36. Characterise the concept of Maintenance 4.0.
- 37. Briefly characterise a selected incremental technology used for rapid prototyping.
- 38. Briefly characterise a selected incremental technology used to manufacture finished products (Rapid Manufacturing) rapidly.
- 39. Briefly characterise a selected additive technology and indicate a conventional technology that can be used together to manufacture prototype series (using the Rapid Tooling approach).
- 40. What are the advantages and disadvantages of additive technologies compared to conventional technologies?
- 41. What 3D digitisation methods can be used to measure the external shapes of objects?
- 42. What 3D digitisation methods can be used to measure the shapes and internal structure of objects?
- 43. Explain the concept of a Digital Twin in the Industry 4.0 concept.
- 44. Characterise autonomous systems and explain their operating principle using a selected example.
- 45. List and discuss the characteristics of data in Big Data technology.
- 46. What types of integration in Industry 4.0 do you know? Characterise one of them.
- 47. Define innovation and list its types depending on technology development and the market.
- 48. What does the assessment of the innovation potential of a concept consist of? List and characterise four fields of innovation depending on the novelty of the design solution and the value of the key technical parameters of the idea.
- 49. Design by analogy. What are the characteristics of using direct analogy in the conceptual design process using Gordon Synaesthesia?
- 50. Characterise the Life Cycle Cost Analysis method.
- 51. List the financial performance indicators and discuss one of them.
- 52. List the essential factors affecting the company's financial liquidity.

ZIP 2nd degree - specialist questions - Production Management

- 1. Explain the concept of Social Product Development and elaborate on the benefits of using this approach in the development of new products.
- 2. Discuss the characteristics that distinguish a 'New Product'.
- 3. Name some methods you know of that support the generation of ideas and describe two of them in more detail.
- 4. The brainstorming method is one of the tools that supports the process of generating ideas. Name and discuss the reasons why this method is considered ineffective.
- 5. Name some methods for evaluating ideas during creative sessions that you know of and describe one of them in more detail.
- 6. De Bono's 6-Hats method is one method for evaluating ideas. Describe what the hats symbolise.
- 7. Explain what the Business Model Canvas is and how it differs from the traditional approach to preparing a business plan.
- 8. Discuss how the use of social media affects the development phase of a new product.
- 9. Explain whether invention and innovation are the same thing. What makes an invention become an innovation and how does this process work?
- 10. Present and discuss the basic cycle of the circular economy
- 11. Present and discuss 6 design strategies for the circular economy
- 12. Present and discuss the stages of work in the Design Thinking methodology
- 13. Give examples of innovation in business models (at least 3 from different sources), discuss one selected example based on the Business Model Canvas tool and indicate the differences between the traditional model on the selected example.
- 14. Smart products and services discuss the levels of product development from traditional (physical) to smart, give examples (min. 5) that indicate the different technologies that enable them to function.
- 15. Industry 4.0 discuss the basic assumptions and technologies. What key problems does it solve in industry (min. 3), justify your answer.
- 16. List and briefly discuss the six basic parameters of project efficiency that should be managed.
- 17. List and discuss the sequence of processes carried out during project management according to the PRINCE2 methodology.
- 18. Name and characterise the seven basic principles of project management according to the PRINCE2 methodology.
- 19. Characterise the quality control process using 3D scanning.
- 20. Characterise the product customisation process using 3D scanning.
- 21. Define reverse engineering and name two applications in mechanical engineering.
- 22. Explain the meaning of the following terms in optimisation: optimisation, decision variables, optimisation criterion/objective function, constraint set, feasible set.
- 23. Characterise one of the multi-criteria optimisation methods (multi-criteria programming).
- 24. What are numerical optimisation methods? Name a few examples and briefly discuss one of the numerical optimisation methods.
- 25. Name and discuss the risk parameters evaluated in the FMEA method.
- 26. Name the steps of the DMAIC process improvement method. Discuss one of them.
- 27. Explain the concept of Quality Management Systems. Discuss the basic requirements of ISO 9001:2015.
- 28. What is a quality house? Discuss the QFD method.
- 29. Discuss the Six Sigma method.
- 30. Characterise a selected method of statistical quality control. Discuss the concepts of repeatability and reproducibility of measurements.
- 31. Discuss the company's resources related to the production process.
- 32. List the types of waste according to Lean and discuss them.

- 33. Discuss the difference in production process improvement between Lean Manufacturing and the traditional approach.
- 34. Present the general characteristics of the Value Stream Mapping method. Discuss what elements are on the map.
- 35. Describe the operation of the suction system and present its types. Explain the principle of the milk run loop.
- 36. Explain the 5S method. Name at least 5 other Lean Manufacturing tools and methods and discuss them.
- 37. Explain the SMED method and how it affects production flexibility. Name the most important stages of its implementation and give examples, referring in particular to the production batch size.
- 38. Discuss the model of organisational improvement according to KAIZEN, discuss the two types of change, present the development of the organisation over time in a diagram, indicate KAIZEN changes and indicate where in the diagram the PDCA cycle takes place.
- 39. Characterise TPM, state the basic assumptions, discuss the pillars, explain how it differs from traditional maintenance.
- 40. Name the basic stages of a product's life and discuss the final stage of a product's life.
- 41. Explain the abbreviation PLM and characterise this class of systems.
- 42. Explain the abbreviations PLM and PDM. Discuss the differences between these systems.
- 43. Name the basic functions of a PDM system and discuss two of them.
- 44. Name the types of product structures (BOM) you know of that occur at different stages of a product's life. Discuss one of them.
- 45. Characterise workflow systems and discuss the workflow system reference model according to the Workflow Management Coalition (WfMC).
- 46. Present the scope of knowledge management in manufacturing companies and the benefits of effective knowledge management.
- 47. Using any example, present and discuss the process of creating explicit knowledge and tacit knowledge from selected useful information and the process of sharing knowledge.
- 48. Discuss the role of organisational culture in effective knowledge management in a company. Present the characteristics of an organisational culture that supports knowledge management.
- 49. How can human resources management activities support knowledge management? Discuss an example of an HRM activity that supports effective knowledge creation or sharing in a company.
- 50. Characterise the impact of individual elements of the organisational structure on knowledge management.
- 51. What are the differences between 'hard' and 'soft' knowledge management tools? Discuss a selected knowledge management tool, taking into account the benefits of using it in a manufacturing company.
- 52. Discuss the principles of the 'multi-component arrangement method' and give an example of its applications.
- 53. Give 5 examples of the application of the multi-element arrangement method in industry, discuss one of them in detail.
- 54. Explain the role of simulation and visualisation using the multi-element arrangement method in the design and construction process implemented for the product market.
- 55. What types of monitoring strategies in flexible manufacturing systems do you know? Describe the market trends that stimulate the development of flexible manufacturing.
- 56. Describe the main functional subsystems of flexible manufacturing systems and give their characteristics.
- 57. Characteristics with emphasis on differences: NC machine tools, machining centre and autonomous machining station.

- 58. Tool circuits in a flexible manufacturing system and their characteristics
- 59. What is the role of cluster analysis and group technology in flexible automated manufacturing?
- 60. Fixing and changing items in flexible manufacturing systems
- 61. What types of workpiece storage do you know of in flexible manufacturing systems?
- 62. What methods of chip removal and processing in flexible manufacturing systems do you know of?