New sets of questions / issues apply to students recruiting from 2021.

Zestaw pytań na egzamin dyplomowy – MANAGEMENT AND MANUFACTURING ENGINEERING/PM – II stopień

The diploma examination commission may ask questions not included in the given sets of issues, which are included in the canon of knowledge of a given degree of study and field of study.

GROUP A

1. Discuss the concept and classical functions of management.
2. Characterize briefly the fundamentals and the role of using CE marking in European Union.
3. Characterize the FMEA method.
4. Give the objectives and characterize shortly the SWOT analysis.
5. The Fillars of TPM
6. What are the key indicators of effective implementation of the production orders?
7. What is the difference between request order and production order? (zamówienie, a zlecenie)
8. What is the method of QFD.
9. What is marketing mix 5P.
10. What is the biomechanics of work and what research methods are used?
11. What are objectives and structure of a marketing plan?
12. Discuss a product lifecycle curve using the chosen example.
13. Characterize some of main principles of a present approach to the quality management.
14. What are objectives and tasks for the intellectual property management in enterprises?
15. List basic functional units of cutting machines.
16. What is the difference between conventional and NC machines?
17. List operational attributes of cutting machines.
18. Name basic technological possibilities of cutting machines (what kind of surfaces are possible to be machined on particular cutting machines?)
19. Hierarchical wastes management rules.
20. List and briefly characterize conventional and renewable energy sources.
21. What is the moment of the force F with respect to the point O?
22. What is the main vector and main moment?
23. What is the mass centre and what are the static moments?
24. Explain the distinction between ductile and brittle structural materials.
25. Discuss the conditions that must be met in order to occurrence of the crystallization. Comment on them.
26. What is safety factor/indicator
27. What is losses of stability? Example on strut.
28. Diagram Fe-Fe3. What is a distribution of steel, cast iron and cast steel
29. What are metals? What are properties of metals are called strength and plastic?

30. Grinding
31. Oscillatory superfinish. Boring.
32. Milling the gear wheels.
33. Electric pressure welding.
34. Coordinate measuring technique and traditional technique.
35. How to determine tolerance dimensions in the drawing?
36. Name and symbols of geometrical tolerance. How to mark geometrical tolerance on the drawing?
37. Name and symbols of positional tolerance . How to mark positional tolerance on the drawing?
38. The design and construction process (Proces projektowo-konstrukcyjny.) 39. The basic concept of the finite element method (FEM) - the types of elements.
40. Definition and examples of applications of link mechanism

GROUP B

1. Discuss the three-step decision-making process in an organisation.
2. Discuss the principles of creating and using the results of BCG analysis in strategic management.
3. Explain and justify the differences in properties between amorphous and crystalline metals. Present applications for each property discussed.
4. Plasma - characteristics and method of formation. Present, with reasons, specific examples of Plasma applications.
5. Explain what the properties of Graphene result from. Discuss the problems related to the production of a Graphene layer.
6. List 3 methods of data analysis included in Supervised Learning.
7. What is a Time Series? Give examples of production-related variables that are Time Series.
8. What is a Regression Model? Give an example of use in production.
9. What is forecasting? What is the purpose of forecasting in production management?
10. Characterise actual trends in the field of normative management systems.
11. Characterise the world and national standardisation systems and essential standardisation documents.
12. List the most common reasons for starting the design of the new layout of workstations.
13. Present the advantages and disadvantages of manufacturing on production lines. Characterise the production line regarding the process, product, demand, type of equipment, transport and storage method.
14. List and discuss at least five criteria for the optimal layout of workstations.
15. List and discuss a minimum of five guidelines for workstations placement positions in the production nest.
16. Discuss the basics of object-oriented systems modelling by explaining terms such as an object, system, state, event, activity and process.
17. Describe the IDEF0 modelling method and explain the definition of the ICOM Box.
18. Characterise the structural diagrams of the UML language on the example of a Class Diagram.
19. Describe the application of the BPMN method and briefly characterise the basic groups of symbols used in its notation.
20. Discuss the principles of organisation management using the behavioural approach, according to Elton Mayo.
21. Compare the American management system with the Japanese management system. What is the Japanese "inverted pyramid" model?
22. According to Jay Lorsch and Paul Lawrence, what is the situational approach to management?
23. List and briefly discuss three of the five points of Design Thinking.
24. Characterise selected methods of product labelling.
25. Discuss the features and advantages of Computer-Aided Traceability systems.

26. Explain what conditions must be met for the Computer-Aided Flow Control system to continue the production process at the next stage of the technological route of the product.
27. List the scheduling criteria. Discuss a selected example of conflicting criteria.
28. Discuss the fundamental principles of product design according to the Design for Reliability concept.
29. Discuss the tasks of Reliability Engineering.
30. List the basic reliability characteristics of the system and discuss one of them.
31. Briefly characterise the selected additive technology used for Rapid Prototyping.
32. Briefly characterise the selected additive technology used for Rapid Manufacturing.
33. How can 3D digitisation methods be used to measure the external shapes of objects?
34. How can 3D digitisation methods measure objects' shapes and their internal structure?
35. Characterise the concept and essence of people management in an organisation. Describe the basic differences between human resource management and personnel administration.
36. Explain the concept of "Digital Twin" in Industry 4.0.
37. List and discuss the characteristics of data in Big Data technology.
38. What types of integration do you know in Industry 4.0? Characterise one of them.
39. Design by analogy. What characterises direct analogy in conceptual design using Gordon's Synectic?
40. List financial efficiency indicators and discuss one of them.

GROUP C

1. Explain the concept of Community-Driven Product Development and describe the benefits of using this approach in new product development.
2. List the methods you are familiar with in generating ideas and describe two of them in more detail.
3. The Brainstorming method is one of the tools supporting the process of generating ideas. List and discuss the reasons why this method is considered ineffective.
4. The "de Bono" method, also called the "Six Thinking Hats", is one method of evaluating ideas. Describe what the symbolic hats used in this method mean.
5. Explain the Business Model Canvas and how it differs significantly from the traditional approach to preparing a Business Plan.
6. Explain if Invention and Innovation are the same? What influences the Invention to become an Innovation, and how does this process proceed?
7. Introduce and discuss the basic cycle of the Circular Economy.
8. Describe the stages of work in the Design Thinking methodology
9. Give examples of innovations in business models (at least 3, each as a different source), discuss one selected example based on the Business Model Canvas tool, and indicate the differences between the traditional model on the selected example.
10. Industry 4.0 - discuss the basic assumptions and technologies. What fundamental industry problems it can solve (at least 3) - justify your answer.
11. List and briefly discuss the ground six project performance parameters that need to be managed.
12. List and discuss the sequence of processes carried out during project management according to the PRINCE2 methodology.
13. Characterize the product individualization process using 3D scanning.
14. Define Reverse Engineering and describe two selected applications in mechanical engineering.
15. Explain the meaning of optimization concepts: optimization, decision variables, optimization criteria, objective function, constraint set, feasible solution set
16. Characterize one of the multi-criteria optimization methods (multi-criteria programming).
17. What are numerical optimization methods? List a few examples and briefly discuss one of the numerical optimization methods.
18. List and discuss the risk parameters assessed in the FMEA method.
19. List the stages of the DMAIC process improvement method. Discuss one of them.
20. Explain the concept of Quality Management Systems. Discuss the basic requirements of ISO 9001:2015.
21. What is a quality house? Discuss the QFD method.
22. Discuss the Six Sigma method.
23. Characterize the chosen method of Statistical Quality Control. Discuss the concepts of repeatability and reproducibility of measurements.
24. List the types of waste defined in the Lean method and discuss them.
25. Present the general characteristics of the Value Stream Mapping method. Discuss what elements are on the map.
26. Describe the pull system and its types. Explain the principle of the Milk Run loop.
27. Describe the SMED method and how it affects production flexibility. List the most important stages of its implementation, provide examples, and refer to the size of the production batch.

28. Characterize TPM, provide basic assumptions, discuss pillars, and explain how it differs from the traditional maintenance approach.
29. Expand the PLM abbreviation and characterize this class of systems.
30. List the essential functions of a PDM system and discuss two of them.
31. List the types of product structure (BOM) that you are familiar with at different product life cycle stages. Discuss one of them.
32. Present the scope of Knowledge Management in manufacturing companies and the benefits of effective Knowledge Management.
33. Discuss the role of organizational culture in effective Knowledge Management in an enterprise. Present the features of the organizational culture supporting Knowledge Management.
34. Characterize the influence of individual elements of the organizational structure on Knowledge Management.
35. Give five examples of the multi-component systems method applications in the industry and discuss one of them in detail.
36. Explain the role of simulation and visualization with the method of a multi-component system in the design and construction process of a product implemented on the market.
37. Present the main functional subsystems of Flexible Manufacturing Systems and provide their characteristics.
38. Compare the definitions of NC machine, machining centre and autonomous machining station. Describe the differences.
39. Describe the fixing and changing methods of a workpiece in the FMS.
40. Describe known types of workpiece storage in Flexible Manufacturing Systems.