

Exam Topic Area: Manufacturing Processes and Materials

Questions on the exam will be thought-provoking, but can be solved with a thorough understanding of the foundations of the topic area. Question difficulty will generally be at the level of challenging undergraduate material, and often require understanding and application of multiple concepts to come to the correct solution.

Questions will test the student's ability to solve problems related to fundamental material behavior, mechanical properties of materials, manufacturing processes, statistical process control and manufacturing systems.

Reference List:

- Black, J. T. and Kohser, R. A., "DeGarmo's Materials and Processes in Manufacturing", 11th Edition, Wiley (Chapters 3-9, 11-15, 19, 20, 28, 29, 30, 31, 34, 35, 36, 44)
- Callister, W. D. and Rethwisch, D. G., "Materials Science and Engineering: An Introduction", 9th Edition, Wiley (Chapters 2, 3, 6, 9-11)

Questions will be drawn from the following list of topics:

- Microstructure of materials and how it relates to material properties
- Material phase, Equilibrium Phase Diagrams, CCT and TTT diagrams
- Heat treatment: processes, effects and microstructural changes
- Major material classes: ferrous and nonferrous alloys, polymers, ceramics, composites
- Casting and molding processes for plastics and metals
- Metal cutting and forming processes
- Joining and assembly processes
- Additive and nontraditional manufacturing processes
- Measurement and inspection; statistical process control and quality engineering
- Manufacturing systems: principles, cell design and line balancing, scheduling

Undergraduate courses offered in this area:

Courses listed here are for your reference only and may be helpful for relearning/reviewing the material. Questions on the exam are limited by the topics list and reference list, not by the material covered in this (these) course(s):

- ME 251 – Introduction to Materials and Manufacturing Processes