



B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2024

(Regulation 2024)

First Semester

COMMON TO AUTO / MECH

24MEI102: Manufacturing Technology

COURSE OUTCOMES

- CO1:** Apply fundamental knowledge of casting processes for quality castings.
- CO2:** Analyze different welding techniques and their applications to select appropriate methods for joining various materials.
- CO3:** Analyze the principles of forming processes to design sheet metal products.
- CO4:** Demonstrate the ability to apply powder metallurgy techniques to refine metal powders.
- CO5:** Explore the principles and applications of additive manufacturing to understand its impact on modern manufacturing practices.

Time: Three Hours

Maximum Marks: 100

PART A (4 * 20 = 80 Marks)

Answer all the Questions

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|----|----|--|----|-----|-------------------|
| 1. | a) | List two common casting defects. | 2 | CO1 | [K ₁] |
| | b) | Explain the role of risers in casting. | 4 | CO1 | [K ₂] |
| | c) | A company implementing centrifugal casting is aiming to reduce the occurrence of inclusions in their castings. Explain the potential sources of inclusions in centrifugal casting and recommend strategies to achieve cleaner cast products. | 4 | CO1 | [K ₃] |
| | d) | An investment casting company is facing challenges with dimensional accuracy and surface finish of their cast parts. Analyze the factors that could contribute to these issues and propose methods to improve the casting quality. Consider the role of pattern making and types of patterns in your analysis. | 10 | CO1 | [K ₄] |
| 2. | a) | Name two types of bulk forming processes. | 2 | CO3 | [K ₁] |
| | b) | Explain how formability of materials influences the forming process. | 2 | CO3 | [K ₂] |

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|-------|--|----|-----|-------------------|
| c) | Explain the inspection and quality control methods used in forming processes. Discuss their significance in ensuring the quality and consistency of formed products. | 6 | CO3 | [K ₃] |
| d) | Identify common defects in forming processes, such as cracking and wrinkling. Analyze the root causes of these defects and discuss the techniques used to minimize them in industrial applications. | 10 | CO3 | [K ₄] |
| 3. a) | What is atomization in powder metallurgy? | 2 | CO4 | [K ₁] |
| b) | Explain how powder properties affect the final product in powder metallurgy. | 2 | CO4 | [K ₂] |
| c) | Explain the differences between uniaxial pressing and isostatic pressing in the compaction of metal powders. Discuss the advantages and limitations of each method. | 6 | CO4 | [K ₃] |
| d) | Discuss the significance of sintering atmospheres in powder metallurgy. Analyze how different sintering atmospheres impact the mechanical properties and microstructure of sintered products. | 10 | CO4 | [K ₄] |
| 4. a) | What is selective laser sintering (SLS)? | 2 | CO5 | [K ₁] |
| b) | Compare the materials used in additive manufacturing and their properties. | 2 | CO5 | [K ₂] |
| c) | Analyze the use of direct metal laser sintering (DMLS) in the automotive industry. Discuss how DMLS can improve the manufacturing process and product performance. | 6 | CO5 | [K ₃] |
| d) | Examine the environmental impact of additive manufacturing compared to traditional manufacturing methods. Analyze how AM can contribute to sustainable manufacturing practices and identify areas for improvement. | 10 | CO5 | [K ₅] |

PART B (1 x 20 = 20 Marks)
Answer any ONE Question

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|-------|--|---|-----|-------------------|
| 5. a) | What is MIG welding? | 2 | CO2 | [K ₁] |
| b) | Discuss the importance of welding parameters in achieving quality welds. | 2 | CO2 | [K ₂] |
| c) | Describe the application of electron beam welding in aerospace manufacturing. Analyze how this technique achieves high-precision welds and the challenges faced in its implementation. | 8 | CO2 | [K ₄] |

- d) Assess the effectiveness of radiographic and ultrasonic testing methods in detecting internal weld defects. Evaluate the advantages and limitations of each method and discuss scenarios where one method may be preferred over the other. 8 CO2 [K₅]

OR

6. a) Name two common welding defects. 2 CO2 [K₁]
 b) Describe the main differences between TIG and MIG welding. 2 CO2 [K₂]
 c) Discuss the common defects encountered in MIG welding, such as porosity and cracks. Analyze the causes of these defects and propose methods to prevent them in future welding operations. 8 CO2 [K₄]
 d) Discuss the role of welding standards in maintaining the quality and consistency of welded structures. Analyze how adherence to standards such as AWS or ISO impacts the reliability and safety of welds in various industries. 8 CO2 [K₄]

CO distribution summary:

	CO1	CO2	CO3	CO4	CO5
Marks (%)	20	20	20	20	20
