



Galgotias College of Engineering and Technology, Greater Noida

Pre University Test (PUT) : Odd Semester 2024 -25

Roll No. :

Course/Branch : B Tech, ME

Semester : VII

Subject Name : Mathematical Modeling of Manufacturing Process

Max. Marks : 100

Subject Code : KME 073

Time : 180min

CO1. Understand the fundamentals of manufacturing processes, mathematical models and their solutions.

CO2. Understand unconventional and conventional machining, their discrete-time linear, non-linear models and solutions.

CO3. Analyze the mechanism of forming and heat transfer in welding.

CO4. Apply the principles of casting, powder metallurgy, coating and additive manufacturing.

CO5. Understand the fundamental of heat treatment, micro / nano manufacturing and processing of non-metallic materials.

Section – A

(10 x 2 = 20 marks)

Q. No.	COx	Question Description
1	a	CO1 What are the key types of engineered materials used in manufacturing? (K1)
	b	CO1 Explain the concept of solid-state deformation. (K1)
	c	CO2 What is statistical modeling in manufacturing, and why is it important? (K1)
	d	CO2 Define melting and solidification in the context of manufacturing processes. (K1)
	e	CO3 Differentiate between orthogonal cutting and oblique cutting. (K1)
	f	CO3 What is tool life, and how is it measured? (K1)
	g	CO4 Briefly explain the principle of fusion welding. (K1)
	h	CO4 What is the basic principle of casting? (K1)
	i	CO5 Define micro-machining and its significance. (K1)
	j	CO5 Mention any two properties evaluated during heat treatment. (K1)

Attempt ALL the questions.

Section – B

(5 x 6 = 30 marks)

Q.2 (CO-1): Discuss the methods to evaluate the properties of manufactured products. (K2)

OR

Q.3 (CO-2): Explain the heat generation mechanism in conventional machining. (K2)

OR

Q.4 (CO-3): Analyze the mechanics of sheet metal forming with examples. (K2)

Q.4 (CO-3): Analyze the mechanics of sheet metal forming with examples. (K2)

OR

Q.5 (CO-4): Describe the solidification process in casting and its importance. (K1)

OR

Q.6 (CO-5): Discuss the importance of micro-to-nano downscaling in manufacturing processes. (K1)

OR

Q.7 (CO-1): Attempt any ONE question.

Q.7 (CO-1): Attempt any ONE question.

Section – C

(5 x 10 = 50 marks)

a. Explain in detail the coupled systems in manufacturing processes, including their mathematical modeling. (K1)

b. Discuss the concept and applications of solid-state phase transformation in manufacturing. (K2)

Q.8 (CO-2): Attempt any ONE question.

a. Solve a numerical problem related to chip formation and force components in machining. Assume suitable data. (K2)

b. Describe the parametric analysis of material removal in non-conventional machining. (K2)

Q.9 (CO-3): Attempt any ONE question.

a. Discuss the residual stresses in welding and their effect on product quality. (K2)

b. Explain the mechanics of bulk metal forming with suitable examples. (K2)

Q.10 (CO-4): Attempt any ONE question.

a. Discuss the principles of powder metallurgy and its advantages in manufacturing. (K2)

b. Describe the development and future scope of additive manufacturing technologies. (K2)

Q.11 (CO-5): Attempt any ONE question.

a. Explain the principle of processing and shaping non-metallic biomaterials. (K2)

b. Discuss the significance and applications of micro-casting in advanced manufacturing. (K2)