U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E. **Semester: VI**

Branch: AEROSPACE ENGINEERING **Duration: 3 hrs.**

Course Code: 23AS6PEEDO / 22AS6PEEDO / 20AE6DEEDO **Max Marks: 100**

Course: Engineering Design and Optimization

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.
3. Use of a scientific pocket calculator is allowed

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

				CO	*PO*	Marks
			UNIT - I			
1	a)		Explain the Four C's of Design and consideration for a good design.	*CO1*	*PO1*	**10**
	b)		Explain the (i) Design paradox between knowledge and freedom and (ii) Design process with product cost and time with the neat diagrams.	*CO1*	*PO2*	**10**
			OR			
2	a)		Explain influence of different parameters that contributes product and their production cost on a product with neat flow diagrams.	*CO1*	*PO1*	**10**
	b)		Briefly explain the control variables between product design, business and production groups with a sketch.	*CO1*	*PO2*	**10**
			UNIT - II			
3	a)		Explain the product–market and portfolio matrices.	*CO2*	*PO1*	**10**
	b)		Explain the steps to identify the customer needs with a neat sketch of the flow chart.	*CO2*	*PO2*	**10**
			OR			
4	a)		Explain the various solution-finding methods for product planning with giving examples.	*CO2*	*PO1*	**10**
	b)		Explain briefly the House of Quality (HOQ) for the product development process with taking an example.	*CO2*	*PO2*	**10**
			UNIT - III			
5	a)		Briefly explain the various types of analogy for concept generation with giving examples.	*CO3*	*PO1*	**10**
	b)		What is concept map? Draw and explain the concept map for recycling of a metal.	*CO3*	*PO2*	**10**

			OR			
	6	a)	List and briefly explain the various concept evaluation methods with giving examples.	*CO3*	*PO1*	**10**
		b)	What is functional decomposition? Draw the schematic functional decomposition diagram of the mechanical pencil example by showing flows and modules.	*CO3*	*PO2*	**10**
			UNIT - IV			
	7	a)	Define embodiment design, and explain briefly its various groups.	*CO4*	*PO1*	**10**
		b)	Explain the advanced tolerance analysis and guidelines for tolerance design.	*CO4*	*PO2*	**10**
			OR			
	8	a)	Explain the Design for Quality (DFQ) and Design for Reliability (DFR) with giving examples.	*CO4*	*PO1*	**10**
		c)	What is Parametric Design? List and explain systematic steps in parametric design.			**10**
			UNIT - V			
	9	a)	Explain the optimal design procedure with a flow chart, discussing the objective function, decision variables and constraints, and solution. Implement the above approach for selecting the best structural design.	*CO5*	*PO1*	**10**
		b)	A furniture maker has 6 units of wood and 28 hours of free time in which he will make decorative screens. Two models have sold well in the past, so he will restrict himself of those two. He estimates that model I requires 2 units of wood and 7 hours of time. Model II requires 1 units of wood and 8 hours of time. The prices of the models are Rs 120 and Rs 80 respectively. How many screens of each model should the furniture maker assemble if the wishes to maximize his sales revenue? Formulate the optimization problem and state the nature of programming required.	*CO5*	*PO2*	**10**
			OR			
	10	a)	List and specify the application of various optimization programming techniques	*CO5*	*PO2*	**10**
		b)	A company has two plants, each of which produces and supplies two products: A and B. The plants can each work up to 16 hours a day. In plant 1, it takes three hours to prepare and pack 1,000 gallons of A and one hour to prepare and pack one quintal of B. In plant 2, it takes two hours to prepare and pack 1,000 gallons of A and 1.5 hours to prepare and pack a quintal of B. In plant 1, it costs Rs 15,000 to prepare and pack 1,000 gallons of A and Rs 28,000 to prepare and pack a quintal of B, whereas in plant 2 these costs are Rs 18,000 and Rs 26,000, respectively. The company is obliged to produce daily at least 10 thousand gallons of A and 8 quintals of B. Formulate the optimization problem to find out as to how the company should organize its production so that the required amounts of the two products be obtained at the minimum cost.	*CO5*	*PO2*	**10**

****