BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: M.TECH/Pre-PhD **SEMESTER: I**
BRANCH: PIE **SESSION: MO/2023**

SUBJECT: PE524 ADVANCED MANUFACTURING TECHNOLOGIES

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions, each of 10 marks and a total of 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data handbook/Graph paper etc., to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Critically analyze and point out the differences between evaporative pattern casting and sand casting.	[5]	1	4
Q.1(b)	Explain the advantages of the semi-solid metal forming process. In short, explain the thixocasting process.	[5]	1	2
Q.2(a)	Why is surface treatment necessary for various engineering components? Cite examples of modification-based, removal-based and addition-based surface engineering methods.	[5]	2	2
Q.2(b)	Distinguish between the physical vapor deposition (PVD) and chemical vapor deposition (CVD) methods of the surface coating. What are the salient features of 'sputtering' in the context of the PVD process?	[5]	2	4
Q.3(a)	What are the advantages of isothermal forging operation? Show the variants of orbital forging with respect to the motion possibilities of the upper tool axis with a suitable diagram. What type of products can be obtained in orbital forging?	[5]	3	3
Q.3(b)	Why were thixoforming processes developed? State and justify the parameters affecting thixoforming processes. Outline the process steps of thixoforging operation.	[5]	3	4
Q.4(a)	Compare and contrast laser beam conduction welding and keyhole welding processes. Discuss the factors that influence the selection of each process for specific applications in the manufacturing industry, and analyze the underlying principles that make one more suitable than the other.	[5]	4	4
Q.4(b)	List and briefly explain two critical challenges faced by underwater welders in their work. Provide a brief description of how these challenges can be addressed for safer and more effective underwater welding.	[5]	4	4
Q.5(a)	What are the primary advantages of cryogenic machining compared to traditional machining methods? Elaborate on how cryogenic machining enhances tool life and workpiece quality, providing examples where it is most beneficial.	[5]	5	2
Q.5(b)	What is Magnetorheological Abrasive Flow Finishing (MRAFF)? Explain the basic principles and applications of MRAFF in finishing processes, and highlight the key advantages of this technique.	[5]	5	2

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