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

CLASS: BTECH **SEMESTER: V**
BRANCH: PRODUCTION AND INDUSTRIAL ENGINEERING **SESSION: MO/2024**

SUBJECT: PE318 RAPID PROTOTYPING AND TOOLING

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 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)	Many terms have been used to mean Rapid Prototyping. Discuss three such terms and explain why they have been used in place of Rapid Prototyping.	[4]	1	1,2
Q.1(b)	Analyze how Rapid Prototyping benefits various stakeholders, including product designers, tool designers, manufacturing engineers, marketers, and consumers, and evaluate its impact on each group's objectives and processes.	[6]	1	4,5
Q.2(a)	Analyse the differences between rapid tooling and conventional tooling. In what specific scenarios would rapid tooling be preferable for a project, and why?	[4]		3,5
Q.2(b)	Create a schematic line diagram of the Stereolithography (SLA) process, and critically evaluate the parameters influencing the quality of parts produced. Analyse the classification of SLA processes, providing a concise description of each, and assess their potential applications. Additionally, list some commercially available SLA systems	[6]		3,4
Q.3(a)	Analyse the types of support structures commonly used in additive manufacturing and evaluate strategies for minimizing their necessity.	[4]		4,5
Q.3(b)	Evaluate the significance of part orientation in 3D manufacturing. Use appropriate diagrams to illustrate how the part orientations influence these aspects.	[6]		3,5
Q.4(a)	Analyse the concept of MEMS and identify five common types of MEMS technologies along with their potential application. Critically examine the role of MEMS in enhancing the functionality and performance of rapid prototyping machines	[4]	4	2,3,4
Q.4(b)	Evaluate the key parameters that influence the Fused Deposition Modelling (FDM) process and analyse the control systems and sensors employed to manage these parameters effectively. Using an appropriate schematic diagram, illustrate these control systems and sensors within the FDM setup.	[6]	4	3,4,5
Q.5(a)	Evaluate the application of non-thermal techniques in enhancing the properties of rapid prototyping products, and discuss their effectiveness in improving product performance	[5]	5	4,5
Q.5(b)	Analyse how Additive Manufacturing (AM) can be applied to create patterns for Room Temperature Vulcanizing (RTV) moulding and illustrate the process with a suitable diagram.	[5]	5	3,4

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