Q. Code:618739

Reg. No. | | | | | | | | | | | | | | |

B.E / B.TECH. DEGREE EXAMINATIONS, MAY 2024

Sixth Semester

ME18002 – 3D PRINTING AND DESIGN

(Mechanical Engineering)

(Regulation 2018/2018A)

TIME: 3 HOURS **MAX. MARKS: 100**

CO 1 Students will be able to understand the principles of AM, file conversion, and STL file structure.

CO 2 Students will be able to understand various additive manufacturing (AM) processes and the process parameters and calculate the build time.

CO 3 Students will be able to understand the various design requirements for Additive Manufacturing.

CO 4 Students will be able to understand various post-processing methods in AM and select suitable property enhancement techniques.

CO5 Students will be able to explain various applications of AM in various fields.

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Justify the need for additive manufacturing technology.	**1**	**3**
2.	Why are laser chosen as a light source for AM?	**1**	**3**
3.	Explain why the parts made from LENS process are denser compared to parts made from SLS.	**2**	**2**
4.	What is photopolymerization? In which AM process this concept is used?	**2**	**2**
5.	Differentiate between low-end and high-end post-processing.	**3**	**3**
6.	What are the advantages of reducing the part count in a product?	**3**	**2**
7.	When do you use Abrasive flow machining process?	**4**	**2**
8.	Why is infiltration needed for AM parts?	**4**	**3**
9.	Differentiate between soft-tooling and hard-tooling.	**5**	**3**
10.	What is remanufacturing?	**5**	**2**

PART- B (5 x 14 = 70 Marks)

			Marks	CO	RBT LEVEL
11.(a)	**(i)**	What are the benefits of AM for various stakeholders?	**(7)**	**1**	**2**
	(ii)	Distinguish between CNC machines and additive manufacturing.	**(7)**	**1**	**3**
		(OR)			
(b)	**(i)**	Explain the generic additive manufacturing process.	**(7)**	**1**	**2**
	(ii)	Explain how reverse engineering helps AM process.	**(7)**	**1**	**2**

12.(a)	**(i)**	Explain the FDM process with a neat sketch.	**(7)**	**2**	**2**
	(ii)	Various process parameters used in FDM process affect the build time, dimensional accuracy, and surface finish. Discuss on this.	**(7)**	**2**	**2**
		(OR)			
(b)	**(i)**	Explain the LENS process with a simple and neat sketch.	**(7)**	**2**	**2**
	(ii)	Compare the parts made from SLS and LENS and decide which process is superior in terms of material properties and applications.	**(7)**	**2**	**2**
13.(a)	**(i)**	Explain part orientation and removal of supports.	**(7)**	**3**	**2**
	(ii)	What do you understand by 'Integrated Assemblies'? What are the advantages of integrated assemblies? Give an example.	**(7)**	**3**	**3**
		(OR)			
(b)	**(i)**	Discuss the challenges the present Solid-Modeling CAD Systems are facing to meet the additive manufacturing's requirements.	**(7)**	**3**	**2**
	(ii)	Discuss the following (i) Hollowing Out Parts and (ii) Interlocking Features with respect to design for additive manufacturing.	**(7)**	**3**	**2**
14.(a)	**(i)**	Discuss on sharp edge contour machining and hole drilling.	**(7)**	**4**	**2**
	(ii)	Explain the machining strategies to be applied for finishing an AM part.	**(7)**	**4**	**2**
		(OR)			
(b)	**(i)**	Discuss the various aspects of Surface Texture Improvement.	**(7)**	**4**	**2**
	(ii)	Discuss the technique of the metal spray process with a simple sketch.	**(7)**	**4**	**2**
15.(a)	**(i)**	Explain the process of building medical models.	**(7)**	**5**	**2**
	(ii)	Describe in detail the various applications of AM models in Engineering Analysis.	**(7)**	**5**	**2**
		(OR)			
(b)	**(i)**	Explain the powder metallurgy tooling process.	**(7)**	**5**	**2**
	(ii)	Write short notes on bi-metallic parts and remanufacturing.	**(7)**	**5**	**2**

PART- C (1 x 10 = 10 Marks)

(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	A component in the shape of a cuboid must be built using an SLA machine. The cross-section has a length of 400 mm and a width of 300 mm; the height of the cuboid is 300 mm. The layer thickness is 1 mm. The diameter of the laser is 10 mm. The scanning speed is 50 mm/s. Calculate the time taken to build the component.	**(10)**	**2**	**3**

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