	iii.	Describe the Stereolithography (SLA) printing process and its applications.	**5**	3	1	3	1
Q.5	i.	Define rapid prototyping and explain how 3D printing facilitates this process.	**4**	3	4	4	2
	ii.	Discuss the applications of 3D printing in the medical field and healthcare, including current uses and future possibilities.	**6**	4	4	4	1
OR	iii.	How does the integration of AI and machine learning in 3D printing contribute to smart manufacturing and Industry 4.0?	**6**	3	5	4	1
Q.6		Attempt any two:					
	i.	Discuss the three phases of reverse engineering and the key activities involved in each phase.	**5**	1	4	5	1
	ii.	Evaluate the tools and techniques used in reverse engineering, focusing on 3D scanning technologies and data processing methods.	**5**	3	5	5	2
	iii.	Explain the process of creating a surface model and solid model from point cloud data in reverse engineering.	**5**	3	3	5	1

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Total No. of Questions: 6 *Total No. of Printed Pages:4*

Enrollment No.....

Faculty of Engineering
End Sem Examination Dec 2024
RA3EL36 3D Printing & Reverse Engineering

Programme: B.Tech. Branch/Specialisation: RA

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

			Marks	**BL**	**PO**	**CO**	**PSO**
Q.1	i.	Which of the following is NOT an advantage of additive manufacturing over traditional manufacturing methods? (a) Reduced material wastage (b) Faster production of prototypes (c) Limited complexity in part design (d) Ability to create complex geometries	**1**	1	1	1	1
	ii.	What is a common limitation of 3D printing compared to traditional manufacturing methods? (a) Inability to create complex geometries (b) Slower production speeds for mass manufacturing (c) Higher costs for prototype development (d) Limited applications in the automotive sector	**1**	2	2	1	2
	iii.	What is the purpose of slicing software in 3D printing? (a) Designing the 3D model (b) Preparing the print bed (c) Converting the 3D model into layers for printing (d) Cleaning the printed object	**1**	2	3	2	1
	iv.	Which material is commonly used for 3D printing and is known for being lightweight and durable? (a) Polylactic acid (b) Bakelite (c) PVC (d) Glass	**1**	1	1	2	1

P.T.O.

v.	Which of the following 3D printing technologies uses a filament of plastic material to create objects layer by layer? (a) Stereolithography (SLA) (b) Selective Laser Sintering (SLS) (c) Fused Deposition Modeling (FDM) (d) Direct Metal Laser Sintering (DMLS)	**1**	1	1	3	2
vi.	Which post-processing technique is typically required for SLA 3D-printed parts? (a) Powder removal (b) UV curing (c) Painting with oil-based paints (d) Annealing at high temperatures	**1**	1	2	3	1
vii.	How is 3D printing utilized in the medical field? (a) To create and customized implants (b) To diagnose diseases (c) Robotic Surgery (d) X-ray machines	**1**	1	2	4	1
viii.	How can artificial intelligence (AI) enhance 3D printing processes? (a) By manually adjusting print settings (b) By predicting and optimizing print parameters for better results (c) By replacing the need for 3D modeling software (d) By reducing the need for digital files	**1**	3	4	4	2
ix.	What is a significant advantage of non-contact 3D scanning methods? (a) They require direct physical contact with the object (b) They can scan delicate objects without causing damage (c) They are the most affordable option for all applications (d) They produce lower-quality data than contact scanners	**1**	1	2	5	2

x.	What is reverse engineering primarily used for in modern industries? (a) Designing new software from scratch (b) Analyzing and understanding existing products to improve them (c) Manufacturing standard off-the-shelf products (d) Routine quality control inspections	**1**	1	2	5	1
Q.2	i.	When was the first 3D printing technology introduced? What was it called?	**2**	1	1	1	1
	ii.	Explain the evolution of additive manufacturing from its inception to its current state.	**3**	2	2	1	1
	iii.	Describe the process involved in 3D printing, including the steps from digital model creation to the final printed object.	**5**	3	3	1	2
OR	iv.	Compare and contrast additive manufacturing with subtractive manufacturing in terms of materials used, production time, and cost.	**5**	3	5	1	2
Q.3	i.	What are the factors that need to be considered when selecting a material for a 3D printing project?	**3**	3	2	2	1
	ii.	Describe the process of creating and exporting 3D models, and explain the role of different 3D modeling software in this process.	**7**	3	3	2	1
OR	iii.	Explain the impact of setting different slicing parameters on the structural integrity and surface finish of 3D-printed objects.	**7**	3	6	2	2
		Attempt any two:					
Q.4	i.	Explain the various post-processing techniques used for 3D-printed parts and their importance in achieving the desired quality.	**5**	3	5	3	1
	ii.	Discuss the differences among Fused Deposition Modeling (FDM), and Selective Laser Sintering (SLS) in terms of process, materials, and applications.	**5**	4	3	3	1

Marking Scheme

RA3EL36 (T) 3 D Printing & Reverse Engineering (T)

Q.1	i)	c) Limited complexity in part design	**1**
	ii)	b) Slower production speeds for mass manufacturing	**1**
	iii)	c) Converting the 3D model into layers for printing	**1**
	iv)	a) Polylactic Acid	**1**
	v)	c) Fused Deposition Modeling (FDM)	**1**
	vi)	b) UV curing	**1**
	vii)	a) To create and customized implants	**1**
	viii)	b) By predicting and optimizing print parameters for better results	**1**
	ix)	b) They can scan delicate objects without causing damage	**1**
	x)	b) Analyzing and understanding existing products to improve them	**1**
Q.2	i.	Initial development – 1 mark Initial name-1 mark	**2**
	ii.	Evolution 3 Marks	**3**
	iii.	3 step- 5 marks	**5**
OR	iv.	5 difference 1 marks each	**5**
Q.3	i.	At least three factors 1 – mark each	**3**
	ii.	Describe the process- 3 marks role of different 3D modelling software- 4 Marks	**7**
OR	iii.	discuss parameters like layer height, print speed, wall thickness, infill pattern, and support structure settings can improve or reduce the strength, weight, and aesthetics of a 3D-printed part.	**7**
Q.4	i.	Any 2 technic- 2.5 Marks each	**5**
	ii.	5 difference 1 marks each	**5**
OR	iii.	Process-4 marks Application-1 marks	**5**
Q.5	i.	rapid prototyping- 2 marks	**4**
	ii.	explain how 3D printing facilitates this process. - 2 marks applications of 3D any 4- 4 marks Future possibilities: 2 marks	**6**
OR	iii.	Role of 3 D printing in smart mfg. &industry 4.0. -3 marks. Integration of AI & ML – 3 marks	**6**
Q.6			
	i.	3 steps- 5 marks	**5**
	ii.	Description of tools and techniques -5 marks	**5**
	iii.	Process- 5 marks	**5**

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P.T.O.