SRM VALLIAMMAI ENGINEERING COLLEGE
(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF INFORMATION TECHNOLOGY

QUESTION BANK

VIII SEMESTER

1908001 – 3D PRINTING AND DESIGN

Regulation – 2019

Academic Year 2025 – 2026(Even Semester)

Prepared by

Dr.D. Sridevi, Associate Professor

SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203.

DEPARTMENT OF INFORMATION TECHNOLOGY

QUESTION BANK

SUBJECT : 1908001 – 3D PRINTING AND DESIGN

SEM / YEAR: VIII Semester/ IV Year

UNIT I 3D PRINTING AND ADDITIVE MANUFACTURING

Introduction, Process, Classification, Advantages, Additive V/s Conventional Manufacturing processes, Applications

PART – A

Q. No.	Questions	BT Level	Competence
1	Define Additive Manufacturing.	BTL1	Remembering
2	Name two applications of Rapid Prototyping.	BTL1	Remembering
3	State the meaning of layer-by-layer fabrication.	BTL1	Remembering
4	Identify the role of a CAD model in AM.	BTL1	Remembering
5	Mention the purpose of slicing a 3D model.	BTL2	Understanding
6	Give an example of how build orientation affects part strength.	BTL2	Understanding
7	List types of support structures used in AM.	BTL2	Understanding
8	Define STL file format.	BTL1	Remembering
9	State the importance of post-processing.	BTL1	Remembering
10	Identify the main difference between subtractive and additive manufacturing.	BTL1	Remembering
11	Give an example of hybrid manufacturing.	BTL2	Understanding
12	Name one purpose of prototyping in product development.	BTL1	Remembering
13	State the role of AM in modern manufacturing.	BTL2	Understanding
14	Give the benefit of layer-by-layer fabrication.	BTL2	Understanding
15	Mention the effect of build orientation on product strength.	BTL2	Understanding
16	Identify the advantage of using support structures.	BTL2	Understanding
17	State the reason for STL file usage.	BTL1	Remembering
18	Give one benefit of post-processing.	BTL2	Understanding
19	Mention the effect of AM on material wastage.	BTL2	Understanding
20	Identify the difference between additive and subtractive methods.	BTL1	Remembering
21	State one application of AM in healthcare.	BTL1	Remembering
22	Give the advantage of hybrid manufacturing.	BTL2	Understanding
23	Mention one industrial application of prototyping.	BTL1	Remembering
24	Identify the purpose of process selection in AM.	BTL2	Understanding

PART – B

Q. No.	Questions	Marks	BT Level	Competence
1	Explain the working principles of 3D printing.	13	BTL4	Analyzing
2	Illustrate the STL models with an example.	13	BTL3	Applying
3	Explain in detail why Stereolithography (SL) is widely recognized as the first 3D printing process.	13	BTL4	Analyzing
4	Explain the following in detail: i. FDM ii. FFF	 6 7	BTL4	Analyzing
5	Explain in detail about the 3D printing material groups.	13	BTL4	Analyzing
6	i. Associate with the diagram and explain the Selective Deposition Lamination. ii. Explain the process of The Electron Beam Melting 3D printing technique.	7 6	BTL4	Analyzing

7	Compare and contrast the additive manufacturing techniques with conventional manufacturing processes.	13	BTL4	Analyzing
8	Illustrate the manufacturing process of 3D printing technology with an example.	13	BTL3	Applying
9	Explain the following in detail: i. Limitations of Traditional Manufacturing process. ii. Advantages of additive manufacturing process over traditional manufacturing process.	6 7	BTL4	Analyzing
10	Apply process parameters to improve AM part quality.	13	BTL3	Applying
11	Illustrate with an example the material types and their working principles of 3D printing.	13	BTL4	Analyzing
12	Apply CAD data to generate an STL file for printing.	13	BTL3	Applying
13	Apply AM for healthcare applications.	13	BTL3	Applying
14	Illustrate with an example the application areas of 3D printing.	13	BTL3	Applying
15	Show influence of layer thickness on quality	13	BTL3	Applying
16	Illustrate the concept of Digital light Processing and Selective laser Sintering with an example.	13	BTL3	Applying
17	Illustrate AM applications in construction.	13	BTL3	Applying
	PART – C			
1	Summarize how 3D printing technologies and materials are categorized.	15	BTL5	Evaluating
2	How the 3D Printed Bone Models Provide True-To-Life Training for Surgeon.	15	BTL5	Evaluating
3	Develop the case study of FDM technology made it easy and efficient to make design changes.	15	BTL6	Creating
4	Compose the details of 3D Printing Aircraft Interiors.	15	BTL6	Creating
5	Defend the any one case study of 3d Printing Technology in Medical Field.	15	BTL5	Evaluating

UNIT II - CAD AND ADDITIVE MANUFACTURING			
CAD for Additive Manufacturing-CAD Data formats, Data translation, Data loss, STL format. Additive Manufacturing Techniques - Stereo- Lithography, LOM, FDM, SLS, SLM, Binder Jet technology.			
	PART – A		
Q. No.	**Questions**	**BT Level**	**Competence**
1	Define CAD and its role in AM.	BTL1	Remembering
2	Name two common CAD data formats.	BTL1	Remembering
3	State the meaning of data translation.	BTL1	Remembering
4	Identify the effect of data loss in CAD models.	BTL2	Understanding
5	Define STL and its purpose.	BTL1	Remembering
6	List the key features of SLA.	BTL1	Remembering
7	Name the material deposition process in FDM.	BTL1	Remembering
8	Identify one advantage of SLS.	BTL2	Understanding
9	What is the difference between SLS and SLM?	BTL2	Understanding
10	Define LOM.	BTL1	Remembering
11	Give an example of Binder Jetting application.	BTL2	Understanding
12	Mention the purpose of tessellation in STL files.	BTL2	Understanding
13	State the role of CAD in AM design.	BTL1	Remembering
14	Give the effect of data translation errors.	BTL2	Understanding
15	State the importance of STL file resolution.	BTL1	Remembering
16	What is the advantage of FDM over SLA?	BTL1	Remembering
17	State the reason for selecting SLS.	BTL1	Remembering
18	Give the benefit of SLM in metal parts.	BTL2	Understanding
19	Mention the effect of layer thickness on SLA.	BTL2	Understanding
20	Identify one limitation of LOM.	BTL2	Understanding
21	State the use of Binder Jetting in rapid production.	BTL1	Remembering

22	Give the advantage of tessellation optimization.	BTL2		Understanding
23	Mention one effect of data loss on part quality.	BTL2		Understanding
24	Identify the purpose of CAD model validation.	BTL2		Understanding
	PART – B			
1	Explain in detail about CAD data translations.	13	BTL4	Analyzing
2	Explain the additive manufacturing techniques of Stereo-Lithography.	13	BTL4	Analyzing
3	Explain in detail (i) Advantages of CAD. (ii) Applications of CAD packages.	7 6	BTL4	Analyzing
4	Apply SLM for aerospace part fabrication	13	BTL3	Applying
5	Explain in detail on laminated object manufacturing techniques.	13	BTL4	Analyzing
6	Explain in detail on the principles of Selective laser sintering is an additive manufacturing technology.	13	BTL4	Analyzing
7	Compare and contrast on the following i. SLS technology. ii. SLM technology.	7 6	BTL4	Analyzing
8	Illustrate about Stereo- Lithography techniques with neat diagram	13	BTL3	Applying
9	Illustrate with an example how does the STL file format store a 3D model?	13	BTL3	Applying
10	Illustrate SLA process for a prototype.	13	BTL3	Applying
11	Analyze the following techniques i. LOM ii. FDM	7 6	BTL4	Analyzing
12	Illustrate effect of CAD errors on AM part	13	BTL3	Applying
13	Explain in detail about CAD data formats and their types.	13	BTL4	Analyzing
14	i. Show STL conversion of a CAD model. ii. Explain the concept of data loss.	7 6	BTL4	Analyzing
15	Apply CAD correction techniques.	13	BTL3	Applying
16	Illustrate with an example the steps involved in producing laminated objects in detail.	13	BTL3	Applying
17	Illustrate the technology of Material Jetting with an example.	13	BTL3	Applying
	PART – C			
1	Evaluate the various common problems of CAD and DWG files.	15	BTL5	Evaluating
2	Integrate the 7 types of additive manufacturing techniques.	15	BTL6	Creating
3	Draw a figure using the following coordinated in CAD Coordinates: A=(100,100), B=(105,100), C=(105,102), D=(109,102),E=(109,104), F=(105,104), G=(105,106), H=(109,106), I=(109,111), J=(100,111), k=(100,109), L=(98,109), M=(98,107), N=(100,107), O=(100,105), P=(102,105), Q=(102,101), R=(100,101).	15	BTL5	Evaluating
4	Integrate the various file formats in CAD and their types.	15	BTL6	Creating
5	Give the Outline the manufacturing techniques for laminated objects.	15	BTL5	Evaluating
	UNIT – III PROCESS			
Process, Process parameter, Process Selection for various applications. Additive Manufacturing Application Domains: Aerospace, Electronics, Health Care, Defense , Automotive, Construction, Food Processing, Machine Tools.				
	PART – A			
Q. No.	**Questions**	**BT Level**		**Competence**
1	Define AM process.	BTL1		Remembering
2	Identify key process parameters.	BTL1		Remembering
3	State the meaning of build speed.	BTL2		Understanding
4	Mention the role of layer thickness.	BTL2		Understanding
5	Name one criterion for process selection.	BTL2		Understanding
6	Give an example of aerospace application.	BTL1		Remembering

7	Identify healthcare application.	BTL1	Remembering	
8	State automotive application.	BTL1	Remembering	
9	Mention defense application.	BTL2	Understanding	
10	Give an example of construction application.	BTL1	Remembering	
11	Identify food processing application.	BTL1	Remembering	
12	State AM use in machine tools.	BTL1	Remembering	
13	Mention the importance of process selection.	BTL2	Understanding	
14	Identify effect of process parameters on accuracy.	BTL2	Understanding	
15	State one advantage of process optimization.	BTL2	Understanding	
16	Name one challenge in aerospace AM.	BTL2	Understanding	
17	Identify a limitation in automotive AM.	BTL2	Understanding	
18	Mention one benefit of AM in healthcare.	BTL2	Understanding	
19	State the influence of build orientation.	BTL2	Understanding	
20	Identify one common material used.	BTL1	Remembering	
21	Give an example of electronics application.	BTL1	Remembering	
22	Mention a construction material.	BTL1	Remembering	
23	State a machine tool AM application.	BTL1	Remembering	
24	Identify one parameter affecting surface finish.	BTL2	Understanding	
	PART – B			
1	Explain the stages of 3D printing process with illustrative diagram	13	BTL4	Analyzing
2	Explain in detail i. Process parameters ii. Additive manufacturing process	6 7	BTL4	Analyzing
3	Illustrates and explain in detail about Process Selection for various applications.	13	BTL3	Applying
4	Explain the role of 3D printing process and design for the following application domain i. Aerospace ii. Automotive	7 6	BTL4	Analyzing
5	Explain the following process parameters in detail i. Dimensional tolerance ii. Shrinkage/Wrapping and Support requirements	5 8	BTL4	Analyzing
6	Explain in detail the use of additive manufacturing process in Health care domain.	13	BTL4	Analyzing
7	Explain the following application domain of Additive manufacturing i. Electronics ii. Machine Tools	7 6	BTL4	Analyzing
8	i. Discuss about 3D printer characteristics in Material extrusion process ii. Write a short note about Additive Manufacturing Application Trends?	7 6	BTL3	Applying
9	How 3D printing design can be used in Constructions. Explain the technology implemented with illustration.	13	BTL3	Applying
10	Illustrate the industries where the amazing capabilities of additive manufacturing have transformed production?	13	BTL3	Applying
11	Sketch with neat classification diagram to select the right 3D printing process based on materials.	13	BTL3	Applying
12	Illustrate the types post processing options for FFF technology with an example.	13	BTL3	Applying
13	i. Explain Additive Manufacturing applications within Food industry. ii. Explain future opportunities of food domain in additive manufacturing.	7 6	BTL4	Analyzing
14	Explain the short note on 3D printing process in Defense and machine tools.	13	BTL4	Analyzing

15	Illustrate the different FFF technology pre-processing choices with an example.	13	BTL3	Applying
16	Apply AM techniques in healthcare device production.	13	BTL3	Applying
17	Apply AM in defense components for efficiency.	13	BTL3	Applying
	PART – C			
1	Evaluate the role of Additive Manufacturing process in various application domain in detail.	15	BTL5	Evaluating
2	Propose a case study on 3D print fuel nozzles for jet engines and its advantage over conventional design.	15	BTL6	Creating
3	Evaluate various setting process parameters.	15	BTL5	Evaluating
4	Tabulate the classification of process with 3D printing technologies and sketch with diagram.	15	BTL6	Creating
5	Design a workflow for healthcare device production using AM.	15	BTL6	Creating

UNIT IV MATERIALS			
Polymers, Metals, Non-Metals, Ceramics, Various forms of raw material- Liquid, Solid, Wire, Powder; Powder Preparation and their desired properties, Polymers and their properties. Support Materials.			
	PART – A		
Q. No.	Questions	BT Level	Competence
1	Define polymers used in AM.	BTL1	Remembering
2	Name two metals used in AM.	BTL1	Remembering
3	Identify non-metals applied in AM.	BTL1	Remembering
4	State the types of ceramics in AM.	BTL1	Remembering
5	Mention one form of raw material.	BTL2	Understanding
6	Name liquid materials used in AM.	BTL1	Remembering
7	Identify solid materials used in AM.	BTL2	Understanding
8	State wire form usage in AM.	BTL1	Remembering
9	Mention powder form application.	BTL2	Understanding
10	Define powder preparation.	BTL1	Remembering
11	Identify one desired property of powders.	BTL2	Understanding
12	State polymers and their property.	BTL1	Remembering
13	Name one support material.	BTL1	Remembering
14	Identify ceramic properties important for AM.	BTL2	Understanding
15	Mention advantages of polymers.	BTL2	Understanding
16	Name metals with high melting point.	BTL2	Understanding
17	State non-metal applications in AM.	BTL2	Understanding
18	Identify bio-polymers.	BTL1	Remembering
19	Mention effect of raw material form on process.	BTL2	Understanding
20	State desired mechanical property for powders.	BTL2	Understanding
21	Identify thermal property needed for metals.	BTL2	Understanding
22	Name a polymer used in FDM.	BTL1	Remembering
23	State property of support material.	BTL1	Remembering
24	Mention importance of material selection.	BTL2	Understanding
	PART – B		

1	Explain the following in detail i. Features of PC ii. Advantages of PLA	7 6	BTL4	Analyzing
2	Explain the different types of 3D printing materials with applicable technologies.	13	BTL4	Analyzing
3	Explain in detail the material that is used for research and prototyping.	13	BTL4	Analyzing
4	Explain the following i. Resine-3D printing Liquid	7	BTL4	Analyzing

	ii. PETG	6		
5	Explain about Outdoor and weather resistance material in detail.	13	BTL4	Analyzing
6	Illustrate with an example the steps in preparation of powder with neat diagram.	13	BTL3	Applying
7	Explain in detail about ceramic and their uses, properties and purpose.	13	BTL4	Analyzing
8	Illustrate the properties of powder preparation and polymers with an example.	13	BTL3	Applying
9	i. Illustrate and explain green printing material used for 3D printing ii. Explain about Polycarbonate material in detail	7 6	BTL3	Applying
10	Illustrate with an example about the Polymers and their properties in detail.	13	BTL3	Applying
11	Explain the features of material used for Fused Deposition Modelling.	13	BTL4	Analyzing
12	i. Show the advantages of using powders as the starting material in RP technology ii. Illustrate the Photopolymer material used in Stereolithography	7 6	BTL3	Applying
13	Show the role of powder material in selective laser sintering & three-dimensional printing	13	BTL3	Applying
14	Explain in detail about support materials.	13	BTL4	Analyzing
15	Illustrate with an example and explain green printing media used in 3D printing.	13	BTL3	Applying
16	Show influence of raw material form on AM process.	13	BTL3	Applying
17	Analyze how powder material affects three-dimensional printing and selective laser sintering.	13	BTL4	Analyzing
	PART – C			
1	Explain in detail about the following material with its related printing technologies i. Acrylonitrile Butadiene Styrene and Polylactic Acid ii. Polypropylene and Polycarbonate iii. PETG	 6 6 3	BTL6	Creating
2	Evaluate the materials used for Binder jetting technology in detail.	15	BTL5	Evaluating
3	Evaluate the features and advantages of Ceramic, Metal, plastic and wax material used in powder bed fusion.	15	BTL5	Creating
4	Integrate the various properties of polymer.	15	BTL6	Evaluating
5	Evaluate how powder material affects three-dimensional printing and selective laser sintering.	15	BTL5	Evaluating

UNIT V ADDITIVE MANUFACTURING EQUIPMENT			
Process Equipment- Design and process parameters-Governing Bonding Mechanism Common faults and troubleshooting - Process Design- Post Processing: Requirement and Techniques- Product Quality.			
	PART – A		
Q. No.	**Questions**	**BT Level**	**Competence**
1	Define process equipment in AM.	BTL1	Remembering
2	Name one process parameter in AM equipment.	BTL1	Remembering
3	State governing bonding mechanisms.	BTL1	Remembering
4	Identify common faults in AM equipment.	BTL2	Understanding
5	Mention troubleshooting methods.	BTL2	Understanding
6	Name one post-processing requirement.	BTL1	Remembering
7	State one post-processing technique.	BTL1	Remembering
8	Identify quality aspects in AM products.	BTL2	Understanding
9	Define process design in AM.	BTL1	Remembering
10	Mention effect of process parameters on bonding.	BTL2	Understanding

11	State a common fault cause.	BTL1	Remembering	
12	Identify influence of equipment design on quality.	BTL2	Understanding	
13	Name one technique to improve product quality.	BTL1	Remembering	
14	Define post-processing requirement.	BTL1	Remembering	
15	State troubleshooting steps for failed parts.	BTL1	Remembering	
16	Mention one product quality parameter.	BTL2	Understanding	
17	Identify process equipment selection criteria.	BTL2	Understanding	
18	Name one effect of incorrect bonding.	BTL1	Remembering	
19	Define common fault identification.	BTL1	Remembering	
20	State post-processing impact on mechanical properties.	BTL2	Understanding	
21	Identify one design parameter for AM equipment.	BTL2	Understanding	
22	Mention one safety requirement.	BTL2	Understanding	
23	Name one inspection method.	BTL2	Understanding	
24	Identify one challenge in AM equipment maintenance.	BTL2	Understanding	
	PART – B			
1	Explain in detail about Design Rules of CAD modelling and STL file preparation.	13	BTL4	Analyzing
2	Explain in detail add form feature of pocket, ribs, channels and holes in data preparation.	13	BTL4	Analyzing
3	Explain in detail about data preparation in design process.	13	BTL4	Analyzing
4	Explain in detail about post processing requirements and techniques.	13	BTL4	Analyzing
5	Explain in detail about bonding mechanism in additive manufacturing.	13	BTL4	Analyzing
6	Explain the troubleshooting mechanism in design process in detail .	13	BTL4	Analyzing
7	Explain in detail on defect related to pre data processing.	13	BTL4	Analyzing
8	Illustrate on Part building defects in 3D Printing process .	13	BTL3	Applying
9	Illustrate with an example the process parameter that influences dimensional accuracy.	13	BTL3	Applying
10	Compare the quality in design and manufacturing.	13	BTL4	Analyzing
11	Sketch the neat diagram and explain about Quality control system for large production.	13	BTL3	Applying
12	Illustrate with an example two aspects that affect the quality control an explain in detail.	13	BTL3	Applying
13	Explain in detail about design process parameters.	13	BTL4	Analyzing
14	Illustrate the following i. A control chart ii. Acceptance sampling	7 6	BTL3	Applying
15	Illustrate with an example the role of STL file in 3D Printing.	13	BTL3	Applying
16	Illustrate with an example the date preparations of channels AMT.	13	BTL3	Applying
17	Show the various CAD models with a neat diagram.	13	BTL3	Applying
	PART – C			
1	Show the Design Rules for 3D Printing Parts and Assemblies.	15	BTL6	Creating
2	Evaluate in detail the defects related to post processing	15	BTL5	Evaluating
3	Propose a case study on additive manufacturing techniques and equipment for polymer, metallic, and ceramic material.	15	BTL6	Creating
4	Justify how product design influences product quality.	15	BTL6	Creating
5	Evaluate in short: i. Strong 2D infills ii. Quick 2D infills. iii. 3D infills.	5 5 5	BTL5	Evaluating