Total No. of Questions : 8]

SEAT No. :

P-652

[Total No. of Pages : 2

[6004]-613

B. E. (Mechanical Engineering)

ELECTIVE IV: ADDITIVE MANUFACTURING

(2019 Pattern) (Semester - VII) (402045C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain process Fused Filament Fabrication (FFF) with suitable sketch. **[6]**

b) Explain process Robocasting with suitable sketch. **[6]**

c) Explain process Multi-jet Modeling (MJM) with suitable sketch. **[6]**

OR

Q2) a) Explain process Plasma Deposition with suitable sketch. **[6]**

b) Explain process Direct Metal Deposition (DMD) with suitable sketch. **[6]**

c) Compare Fused Deposition Modeling (FDM) with Fused Filament Fabrication (FFF) Techniques. **[6]**

Q3) a) Explain use of Polymers in Additive Manufacturing with important process parameters,benefits, drawbacks, Limitations and appropriate applications. **[6]**

b) Describe rules and recommendations for metal based additive manufacturing process and product. **[6]**

c) Write a short note on Surface enhancement Techniques used in additive manufacturing based products. **[5]**

OR

P.T.O.

Q4) a) Explain use of Shape-Memory Alloys in Additive Manufacturing with important process parameters, benefits, drawbacks, Limitations and appropriate applications. **[6]**

b) Write a short note on Hot isostatic pressing of additive manufacturing based products. **[6]**

c) Explain error sources in Additive Manufacturing. **[5]**

Q5) a) Explain the Construction, Layout and sub-system of Material Jetting process based 3D Printers. **[6]**

b) Explain the Construction, Layout and sub-system of Direct Metal Laser Sintering [DMLS] process based 3D Printers. **[4]**

c) Explain the classification of Equipment Topology/Layout Frame Designs used in 3D Printers with illustrations. **[8]**

OR

Q6) a) Explain the Construction, Layout and sub-system of Fused Filament Fabrication [FFF] process based 3D Printers **[6]**

b) Explain the Construction, Layout, sub-system and sub-type of DELTA based 3D Printers' Topology/Layout Frame Designs. **[6]**

c) Explain the types of filling pattern used in different slicing and path planning. **[6]**

Q7) a) Explain how additive manufacturing is used in Automotive Industries. Also write merits, demerits and practical feasible applications with illustrations. **[9]**

b) Write a short note on Bio-materials and its applications. **[8]**

OR

Q8) a) Explain how additive manufacturing is used in Health-Care Sector. Also write merits, demerits and practical feasible applications with illustrations. **[9]**

b) Write a short note on 3D Printing and its application in Mass Production of goods. **[8]**

Savitribai Phule Pune University				
Department of Mechanical Engineering				
Unit 3 : Extrusion and energy based Techniques - Theory Question Bank				
Subject: Additive Manufacturing [402045C]				Class: BE
Sr. No.	**Question Statement**	**CO**	**BL**	**Marks**
1	Explain the process of Fused Deposition Modeling (FDM) with suitable sketch. Also write merits, demerits and applications.	3	2, 6	09
2	Explain the process of Direct Metal Deposition (DMD) with suitable sketch. Also write merits, demerits and applications.	3	2, 6	09
3	Explain the process of Robocasting with suitable sketch. Also write merits, demerits and applications.	3	2, 6	08
4	Describe with neat sketch the Direct Ink Writing (DIW) technique and process physics associated with it.	3	2, 6	08
5	Explain Bio-printing with principle, construction and working with suitable sketch.	3	2, 6	08
6	Explain the process of Polyjet Printing with suitable sketch. Also write merits, demerits and applications.	3	2, 6	09
7	Explain the process of Binder Jetting with suitable sketch. Also write merits, demerits and applications.	3	2, 6	09
8	Explain the process of Electron Beam-based DED with suitable sketch. Also write merits, demerits and applications.	3	2, 6	09
9	Explain the process of Direct Metal Deposition (DMD) with suitable sketch. Also write merits, demerits and applications.	3	2, 6	09
10	Explain the process of Multi-jet Modeling (MJM) with suitable sketch. Also write merits, demerits and applications.	3	2, 6	09

Savitribai Phule Pune University				
Department of Mechanical Engineering				
Unit 4 : Materials and Design for AM - Theory Question Bank				
Subject: Additive Manufacturing [402045C]				Class: BE
Sr. No.	**Question Statement**	**CO**	**BL**	**Marks**
1	What is DFAM? What are the rules and recommendations for DFAM?	4	2, 6	08
2	Explain types of material used in Additive Manufacturing. Also write merits, demerits and application.	4	2, 6	09
3	Discuss the significance of Surface enhancement Techniques in AM. Explain any two Surface enhancement Techniques.	4	2, 6	09
4	What are the different types of post processing techniques in AM? Why post processing is necessary in additive manufacturing?	4	2, 6	09
5	Explain phase transformation in AM.	4	2, 6	08
6	Explain the materials used in 4D Printing with important process parameters, benefits, drawbacks, Limitations and appropriate applications.	4	2, 6	09
7	Explain use of Shape-Memory Alloys in Additive Manufacturing with important process parameters, benefits, drawbacks, Limitations and appropriate applications.	4	2, 6	09
8	Explain use of Biomimetic Materials in Additive Manufacturing with important process parameters, benefits, drawbacks, Limitations and appropriate applications.	4	2, 6	09
9	Explain the criteria of material selection in Additive Manufacturing with suitable examples.	4	2, 6	09
10	Explain varieties of heat treatment applied in pre- and post-processing of additive manufacturing based products.	4	2, 6	08

Savitribai Phule Pune University				
Department of Mechanical Engineering				
Unit 5 : Hardware and Software for AM - Theory Question Bank				
Subject: Additive Manufacturing [402045C]				Class: BE
Sr. No.	**Question Statement**	**CO**	**BL**	**Marks**
1	Describe any four Preparatory function [G code] and any four Miscellaneous function [M code] used in additive manufacturing.	5	2, 6	08
2	What are the different types of Types of In-fill pattern? Describe in details.	5	2, 6	09
3	Explain and illustrate the different types of slicing and path planning.	5	2, 6	09
4	Explain the design considerations of Powder Bed Spreading Mechanisms also known as recoater system used in Metal based 3D Printers.	5	2, 6	09
5	Explain the Construction, Layout and sub-system of Fused Deposition Modeling [FDM] process based 3D Printers.	5	2, 6	08
6	Explain the classification of Equipment Topology/Layout Frame Designs used in 3D Printers with illustrations.	5	2, 6	09
7	Explain the Construction, Layout and sub-system of Selective Laser Sintering [SLS] process based 3D Printers.	5	2, 6	08
8	Explain Cold end and hot end of Extruders used in Polymer based 3D Printers.	5	2, 6	08
9	Explain the design considerations of different types of nozzles used in Polymer based 3D Printers.	5	2, 6	08
10	Explain function of gas circulation system, powder handling system and base plate in 3D printer.	5	2, 6	08

Savitribai Phule Pune University				
Department of Mechanical Engineering				
Unit 6 : Case Studies, Application and Special Topics - Theory Question Bank				
Subject: Additive Manufacturing [402045C]				Class: BE
Sr. No.	**Question Statement**	**CO**	**BL**	**Marks**
1	Explain how additive manufacturing is used in Automotive Industries. Also write merits, demerits and practical feasible applications with illustrations.	6	2, 6	09
2	Explain how additive manufacturing is used in Assistive Devices Sector. Also write merits, demerits and practical feasible applications with illustrations.	6	2, 6	09
3	What is 4D Printing? Explain and illustrate its applications.	6	2, 6	08
4	What is 5D Printing? Explain and illustrate its applications.	6	2, 6	08
5	What is Bio-printing? Explain and illustrate its applications.	6	2, 6	08
6	What are the Bio-materials? Explain and illustrate their applications.	6	2, 6	08
7	Explain the Trends in 3D Printing Mass Customization.	6	2, 6	08
8	Explain how additive manufacturing is used in Jewelry Sector. Also write merits, demerits and practical feasible applications with illustrations.	6	2, 6	09
9	Explain how additive manufacturing is used in Bio-medical Applications. Also write merits, demerits and practical feasible applications with illustrations.	6	2, 6	09
10	Explain how additive manufacturing is used in Aerospace Industries. Also write merits, demerits and practical feasible applications with illustrations.	6	2, 6	09

Total No. of Questions : 8]

SEAT No. :

PA-2642

[Total No. of Pages : 3

[5927]-423

B.E. (Mechanical Engineering)

(402045C) ADDITIVE MANUFACTURING

(2019 Pattern) (Semester - VII) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain process Fused Deposition Modeling (FDM) with suitable sketch. Also write merits, demerits and application. **[8]**

b) Explain process Direct Ink Writing (DIW) with suitable sketch. **[5]**

c) Explain process Polyjet Printing with suitable sketch. **[5]**

OR

Q2) a) Explain process Color-Jet Printing (CJP) with suitable sketch. List it's Benefits, Drawbacks, Limitations and Applications. **[8]**

b) Explain process Electron Beam-based DED with suitable sketch. **[5]**

c) Compare Extrusion-Based Deposition with Energy Deposition Techniques. **[5]**

Q3) a) Explain use of Metals in Additive Manufacturing with important process parameters, benefits, drawbacks, Limitations and appropriate applications. **[6]**

P.T.O.

b) Explain varieties of heat treatment applied in pre- and post-processing of additive manufacturing based products. **[6]**

c) Write a short note on acetone treatment in post-processing of additive manufacturing based products. **[5]**

OR

Q4) a) Explain the Process specific strategies used in quality control of material specific additive manufacturing based products. **[6]**

b) Write a short note on DfAM based Process specific strategies. **[6]**

c) Write a short note on Support Removal in post-processing of additive manufacturing based products. **[5]**

Q5) a) Explain the two approaches used in Photopolymerization process based 3D printers. **[6]**

b) Explain the Construction, Layout and sub-system of Selective Laser Sintering [SLS] process based 3D Printers. **[6]**

c) Explain the Construction, Layout, sub-system and sub-type of Cartesian based 3D Printers' Topology/Layout Frame Designs. **[6]**

OR

Q6) a) Explain the Construction, Layout and sub-system of Binder Jetting process based 3D Printers. **[6]**

b) Explain the Construction, Layout, sub-system and sub-type of Extruder Design used in Polymer based 3D Printer Construction. **[6]**

c) Explain the M-codes used in the Control software of Additive Manufacturing based 3D Printers. **[6]**

Q7) a) Explain how additive manufacturing is used in Aerospace Industries. Also write merits, demerits and practical feasible applications with illustrations. **[9]**

b) Write a short note on 4D Printing and its applications. **[8]**

OR

Q8) a) Explain how additive manufacturing is used in Machine-Tools Industries. Also write merits, demerits and practical feasible applications with illustrations. **[9]**

b) Explain how additive manufacturing is used in Personalized Surgery Sector. Also write merits, demerits and practical feasible applications with illustrations. **[8]**

Total No. of Questions : 8]

SEAT No. :

PD4707

[Total No. of Pages : 2

[6404]-213

B.E. (Mechanical)

ADDITIVE MANUFACTURING

(2019 Pattern) (Semester - VII) (402045C) (Elective - IV) (Theory)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks***
4) ***Assume suitable data wherever necessary.***

Q1) a) Explain process Direct Ink Writing (DIW) and Robocasting with suitable sketch. **[9]**

b) Explain process Direct Metal Deposition (DMD) with suitable sketch. **[9]**

OR

Q2) a) Explain process TIG deposition in additive manufacturing. List its Benefits, Limitations and Applications. **[9]**

b) Write short notes on Extrusion. Give its advantages and disadvantages. **[9]**

Q3) a) Explain different quality considerations in A.M. **[9]**

b) Explain Robocasting and Bio printing with suitable example. **[8]**

OR

Q4) a) Explain use of Metals in Additive Manufacturing with important process parameters, benefits, drawbacks, Limitations and appropriate applications. **[9]**

b) What are the different types of post processing techniques in AM? Why post processing is necessary in additive manufacturing? **[8]**

P.T.O.

Q5) a) Explain the process and mechanism used in Multi-Jet Modeling (MJM). **[9]**

b) Explain the design considerations of different types of nozzles used in Polymer based 3D Printers. **[8]**

OR

Q6) a) What is calibration of 3D Printer and Explain raw material manipulation in details with suitable examples. **[9]**

b) What are the bio active materials in additive manufacturing state its application. **[8]**

Q7) a) Write short notes on Mass Customization and Future trends in additive manufacturing. **[9]**

b) Explain application of AM in Food-Processing, Food & Consumer Applications with suitable case study. **[9]**

OR

Q8) a) Explain application of AM in Personalized Surgery, Bio-medical Applications with suitable case study. **[9]**

b) Explain with the example of case studies additive manufacturing in aerospace and machine tools. **[9]**

AM June 2024 QP - 2024 question paper

B.e. (mechanical) (Savitribai Phule Pune University)

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Total No. of Questions : 8]

SEAT No. :

PB2370

[Total No. of Pages : 2

[6263]-220
B.E. (Mechanical Engineering)
ADDITIVE MANUFACTURING
(2019 Pattern) (Semester-VII) (Elective-IV) (402045C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain the process of Polyjet Printing with suitable sketch. Also write merits, demerits and applications. **[9]**

b) Explain the process of Direct Metal Deposition (DMD) with suitable sketch. Also write merits, demerits and applications. **[9]**

OR

Q2) a) Explain Bio-printing with principle, construction and working with suitable sketch. **[9]**

b) Explain the process of Fused Deposition Modeling (FDM) with suitable sketch. Also write merits, demerits and applications. **[9]**

Q3) a) Explain varieties of heat treatment applied in pre- and post-processing of additive manufacturing based products. **[8]**

b) Explain types of material used in Additive Manufacturing. Also write merits, demerits and application. **[9]**

OR

Q4) a) Explain the materials used in 4D Printing with important process parameters, benefits, drawbacks, Limitations and appropriate applications. **[9]**

b) Explain use of Shape-Memory Alloys in Additive Manufacturing with important process parameters, benefits, drawbacks, Limitations and appropriate applications. **[8]**

P.T.O.

Q5) a) Explain Cold end and hot end of Extruders used in Polymer based 3D Printers. **[9]**

b) Explain the design considerations of Powder Bed Spreading Mechanisms also known as recoater system used in Metal based 3D Printers. **[9]**

OR

Q6) a) Explain function of gas circulation system, powder handling system and base plate in 3D printer**.** **[9]**

b) Explain the classification of Equipment Topology/Layout Frame Designs used in 3D Printers with illustrations. **[9]**

Q7) a) What is 4D Printing? Explain and illustrate its applications. **[8]**

b) Explain how additive manufacturing is used in Assistive Devices Sector. Also write merits, demerits and practical feasible applications with illustrations. **[9]**

OR

Q8) a) Explain how additive manufacturing is used in Bio-medical Applications. Also write merits, demerits and practical feasible applications with illustrations. **[9]**

b) What are the Bio-materials? Explain and illustrate their applications. **[8]**

Total No. of Questions : 8]

SEAT No. :

PC2493

[Total No. of Pages : 2

[6354]-622
B.E. (Mechanical)
ADDITIVE MANUFACTURING
(2019 Pattern) (Semester - VII) (Elective - IV) (402045 C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain process Fused Deposition Modeling (FDM) with suitable sketch. List its Benefits, Limitations and Applications. **[9]**

b) Explain process Binder Jetting with suitable sketch. **[9]**

OR

Q2) a) Explain process TIG deposition in additive manufacturing. List its Benefits, Limitations and Applications. **[9]**

b) Explain process Plasma Arc Deposition. List its Benefits, Limitations and Applications. **[9]**

Q3) a) Explain different quality considerations in Additive Manufacturing. **[9]**

b) Explain Robocasting and Bio Printing with suitable example. **[8]**

OR

Q4) a) Write short notes on Surface enhancement Techniques in Additive manufacturing. **[9]**

b) Explain varieties of chemical treatment applied in pre-and post-processing of additive manufacturing based products. **[8]**

P.T.O.

Q5) a) What is calibration of 3D Printer and Explain raw material manipulation in details with suitable examples. **[9]**

b) Explain the design considerations of Positioning Devices and Scanners system used in Laser-Based Metal 3D Printers. **[8]**

OR

Q6) a) Explain the process and mechanism used in Multi-Jet modeling (MJM). **[9]**

b) What are the bio active materials in additive manufacturing state its application. **[8]**

Q7) a) Explain how additive manufacturing is used in Electronics Industries. Also write merits, demerits and practical feasible applications with illustrations. **[9]**

b) Write short notes on Mass Customization and Future trends in additive manufacturing. **[9]**

OR

Q8) a) Explain application of AM in Personalized Surgery, Bio-medical Applications with suitable case study. **[9]**

b) Explain how additive manufacturing is used in Food & Consumer Applications Sector. Also write merits, demerits and practical feasible applications with illustrations. **[9]**

❋ ❋ ❋

Q5) a) Explain the design considerations of different types of nozzles used in Polymer based 3D Printers. **[9]**

b) Explain the design considerations of Positioning Devices and Scanners System used in Laser-Based Metal 3D Printers. **[8]**

OR

Q6) a) Explain the process and mechanism used in Multi-Jet modeling (MJM). **[9]**

b) What is calibration of 3D Printer? Explain the steps in details. **[8]**

Q7) a) Explain how additive manufacturing is used in Electronics Industries. Also write merits, demerits and practical feasible applications with illustrations. **[9]**

b) Write a short note on 4D Printing and 5D Printing and its applications. **[9]**

OR

Q8) a) Explain how additive manufacturing is used in Assistive Devices Sector. Also write merits, demerits and practical feasible applications with illustrations. **[9]**

b) Write use, method and application of bio printing. Explain with example of case studies additive manufacturing in aerospace and machine tools. **[9]**

Total No. of Questions : 8]

SEAT No. :

P6673

[Total No. of Pages : 2

[6181] - 241

B.E. (Mechanical Engineering)

ADDITIVE MANUFACTURING

(2019 Pattern) (Semester - VII) (Elective - IV) (402045 C) (Theory)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q8.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data wherever necessary.*

Q1) a) Explain process Fused Filament Fabrication (FFF) with suitable sketch. **[9]**

b) Explain process Bio-printing with suitable sketch. **[9]**

OR

Q2) a) Explain process Direct Ink Writing (DIW) with suitable sketch. **[9]**

b) Explain process Direct Metal Deposition (DMD) with suitable sketch. **[9]**

Q3) a) Explain the materials used in 4D Printing with important process Parameters, benefits, Limitations and appropriate applications. **[9]**

b) Explain varieties of chemical treatment applied in pre- and post-processing of additive manufacturing based products. **[8]**

OR

Q4) a) Explain Robocasting and Bio printing with suitable example. **[9]**

b) Explain use of Ceramics in Additive Manufacturing with important process parameters, benefits, Limitations and appropriate applications. **[8]**

P.T.O.

Total No. of Questions : 8]

SEAT No. :

P-8685

[Total No. of Pages : 2

[6181]-269

B.E. (Mechanical Engineering) (Sandwich)

ADDITIVE MANUFACTURING

(2019 Pattern) (Semester - VIII) (402045C) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

Q1) a) Explain the working principle of fused deposition modelling with neat sketch. Discuss the possible defects in this method. **[9]**

b) Explain the printing mechanism involved in direct ink writing with neat sketch. Give their advantages and applications. **[9]**

OR

Q2) a) Explain Direct metal deposition. List its Benefits and Limitations. **[9]**

b) Explain the process polyjet printing. Also write the applications, merits and demerits. **[9]**

Q3) a) Explain the post processing steps involved in powder based additive manufacturing. **[9]**

b) Explain with an example how the material and the additive manufacturing method can be selected for various applications. **[8]**

OR

Q4) a) Discuss the various techniques used to enhance the surface properties of additively manufactured parts. **[8]**

b) Explain the various design considerations/rules involved in additive manufacturing with the help suitable sketch. **[9]**

P.T.O.

Q5) a) Define slicing and their types. Explain the various infill strategies used for area filling the sliced model. **[9]**

b) Explain the construction details of 3D printers. **[9]**

OR

Q6) a) Explain the construction of 3D printers. List their advantages and applications. **[9]**

b) Explain the steps followed while slicing a CAD model in slicing software Explain the construction of extrusion based printers. **[9]**

Q7) a) Discuss the benefits of additive manufacturing in the research and development sector. **[9]**

b) Discuss a case study on how the performance of automobile parts can be improved by adopting additive manufacturing. **[8]**

OR

Q8) a) How additive manufacturing can influence the mass customization? Explain in detail mentioning its future trends. **[9]**

b) Discuss the application of 3D printing in art. fashion and Jewellery industry. **[8]**

Savitribai Phule Pune University				
Department of Mechanical Engineering				
Unit 6 : Case Studies, Application and Special Topics - Theory Question Bank				
Subject: Additive Manufacturing [402045C]				Class: BE
Sr. No.	Question Statement	CO	BL	Marks
1	Explain how additive manufacturing is used in Automotive Industries. Also write merits, demerits and practical feasible applications with illustrations.	6	2, 6	09
2	Explain how additive manufacturing is used in Assistive Devices Sector. Also write merits, demerits and practical feasible applications with illustrations.	6	2, 6	09
3	What is 4D Printing? Explain and illustrate its applications.	6	2, 6	08
4	What is 5D Printing? Explain and illustrate its applications.	6	2, 6	08
5	What is Bio-printing? Explain and illustrate its applications.	6	2, 6	08
6	What are the Bio-materials? Explain and illustrate their applications.	6	2, 6	08
7	Explain the Trends in 3D Printing Mass Customization.	6	2, 6	08
8	Explain how additive manufacturing is used in Jewelry Sector. Also write merits, demerits and practical feasible applications with illustrations.	6	2, 6	09
9	Explain how additive manufacturing is used in Bio-medical Applications. Also write merits, demerits and practical feasible applications with illustrations.	6	2, 6	09
10	Explain how additive manufacturing is used in Aerospace Industries. Also write merits, demerits and practical feasible applications with illustrations.	6	2, 6	09

Savitribai Phule Pune University				
Department of Mechanical Engineering				
Unit 3 : Extrusion and energy based Techniques - Theory Question Bank				
Subject: Additive Manufacturing [402045C]				Class: BE
Sr. No.	Question Statement	CO	BL	Marks
1	Explain the process of Fused Deposition Modeling (FDM) with suitable sketch. Also write merits, demerits and applications.	3	2, 6	09
2	Explain the process of Direct Metal Deposition (DMD) with suitable sketch. Also write merits, demerits and applications.	3	2, 6	09
3	Explain the process of Robocasting with suitable sketch. Also write merits, demerits and applications.	3	2, 6	08
4	Describe with neat sketch the Direct Ink Writing (DIW) technique and process physics associated with it.	3	2, 6	08
5	Explain Bio-printing with principle, construction and working with suitable sketch.	3	2, 6	08
6	Explain the process of Polyjet Printing with suitable sketch. Also write merits, demerits and applications.	3	2, 6	09
7	Explain the process of Binder Jetting with suitable sketch. Also write merits, demerits and applications.	3	2, 6	09
8	Explain the process of Electron Beam-based DED with suitable sketch. Also write merits, demerits and applications.	3	2, 6	09
9	Explain the process of Direct Metal Deposition (DMD) with suitable sketch. Also write merits, demerits and applications.	3	2, 6	09
10	Explain the process of Multi-jet Modeling (MJM) with suitable sketch. Also write merits, demerits and applications.	3	2, 6	09

Savitribai Phule Pune University
Department of Mechanical Engineering

Savitribai Phule Pune University				
Department of Mechanical Engineering				
Unit 4 : Materials and Design for AM - Theory Question Bank				
Subject: Additive Manufacturing [402045C]				Class: BE
Sr. No.	Question Statement	CO	BL	Marks
1	What is DFAM? What are the rules and recommendations for DFAM?	4	2, 6	08
2	Explain types of material used in Additive Manufacturing. Also write merits, demerits and application.	4	2, 6	09
3	Discuss the significance of Surface enhancement Techniques in AM. Explain any two Surface enhancement Techniques.	4	2, 6	09
4	What are the different types of post processing techniques in AM? Why post processing is necessary in additive manufacturing?	4	2, 6	09
5	Explain phase transformation in AM.	4	2, 6	08
6	Explain the materials used in 4D Printing with important process parameters, benefits, drawbacks, Limitations and appropriate applications.	4	2, 6	09
7	Explain use of Shape-Memory Alloys in Additive Manufacturing with important process parameters, benefits, drawbacks, Limitations and appropriate applications.	4	2, 6	09
8	Explain use of Biomimetic Materials in Additive Manufacturing with important process parameters, benefits, drawbacks, Limitations and appropriate applications.	4	2, 6	09
9	Explain the criteria of material selection in Additive Manufacturing with suitable examples.	4	2, 6	09
10	Explain varieties of heat treatment applied in pre- and post-processing of additive manufacturing based products.	4	2, 6	08

Savitribai Phule Pune University				
Department of Mechanical Engineering				
Unit 5 : Hardware and Software for AM - Theory Question Bank				
Subject: Additive Manufacturing [402045C]				Class: BE
Sr. No.	Question Statement	CO	BL	Marks

Savitribai Phule Pune University				
Department of Mechanical Engineering				
Unit 5 : Hardware and Software for AM - Theory Question Bank				
Subject: Additive Manufacturing [402045C]				Class: BE
Sr. No.	Question Statement	CO	BL	Marks
1	Describe any four Preparatory function [G code] and any four Miscellaneous function [M code] used in additive manufacturing.	5	2, 6	08
2	What are the different types of Types of in-fill pattern? Describe in details.	5	2, 6	09
3	Explain and illustrate the different types of slicing and path planning.	5	2, 6	09
4	Explain the design considerations of Powder Bed Spreading Mechanisms also known as recoater system used in Metal based 3D Printers.	5	2, 6	09
5	Explain the Construction, Layout and sub-system of Fused Deposition Modeling [FDM] process based 3D Printers.	5	2, 6	08
6	Explain the classification of Equipment Topology/Layout Frame Designs used in 3D Printers with illustrations.	5	2, 6	09
7	Explain the Construction, Layout and sub-system of Selective Laser Sintering [SLS] process based 3D Printers.	5	2, 6	08
8	Explain Cold end and hot end of Extruders used in Polymer based 3D Printers.	5	2, 6	08
9	Explain the design considerations of different types of nozzles used in Polymer based 3D Printers.	5	2, 6	08
10	Explain function of gas circulation system, powder handling system and base plate in 3D printer.	5	2, 6	08

Savitribai Phule Pune University				
Department of Mechanical Engineering				
Unit 6 : Case Studies, Application and Special Topics - Theory Question Bank				
Subject: Additive Manufacturing [402045C]				Class: BE
Sr. No.	Question Statement	CO	BL	Marks
1	Explain how additive manufacturing is used in Automotive	6	2, 6	09