

1	Name of Course	Certificate Course In 3D Design & Printing (W.E.F.2016-2017)																																										
2	Course Code	303175																																										
3	Max. No. of Students Per Batch	25 Students																																										
4	Duration	6 Month																																										
5	Type	Part Time																																										
6	No Of Days / Week	6 Days																																										
7	No Of Hours /Days	4 Hrs																																										
8	Space Required	Theory Class Room – 200 sqft <u>Practical</u> – 200 sq.ft. <b>Total = 400 sq. ft.</b>																																										
9	Minimum Entry Qualification	S. S.C. Passed																																										
10	Objective Of Course	To create skill manpower in Industrial Manufacturing and Design																																										
11	Employment Opportunities	1) Can works as product Designer or Operator in Manufacturing Process 2) Can be an Entrepreneur																																										
12	Teacher’s Qualification	Degree / Diploma in Engg or Applied Art with two years experience. Experience in Cad / Cam / Design																																										
13	Training System	<table><tr><th colspan="5">Training System Per Week</th></tr><tr><th>Theory</th><th>Practical</th><th>Total</th><th colspan="3"></th></tr><tr><td>6 Hours</td><td>18 Hours</td><td>24 Hours</td><th colspan="3"></th></tr></table>								Training System Per Week					Theory	Practical	Total				6 Hours	18 Hours	24 Hours																					
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14	Exam. System		<table><tr><th>Sr. No.</th><th>Paper Code</th><th>Name of Subject</th><th>TH/PR</th><th>Hours</th><th>Max. Marks</th><th>Min. Marks</th></tr><tr><td>1</td><td>30317511</td><td>Introduction to 3D Printing</td><td>TH I</td><td>3 hrs</td><td>100</td><td>35</td></tr><tr><td>2</td><td>30317512</td><td>Elements of Design &amp; Manufacturing in 3D printing</td><td>TH II</td><td>3 hrs</td><td>100</td><td>35</td></tr><tr><td>3</td><td>30317521</td><td>Printing a 3D File</td><td>PR I</td><td>3 hrs</td><td>200</td><td>100</td></tr><tr><td></td><td></td><td>Total</td><td></td><td></td><td>400</td><td>170</td></tr></table>	Sr. No.	Paper Code	Name of Subject	TH/PR	Hours	Max. Marks	Min. Marks	1	30317511	Introduction to 3D Printing	TH I	3 hrs	100	35	2	30317512	Elements of Design & Manufacturing in 3D printing	TH II	3 hrs	100	35	3	30317521	Printing a 3D File	PR I	3 hrs	200	100			Total			400	170						
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## SYLLABUS :- 3D Design & Printing

	<b>Theory – I - Introduction to 3D Printing</b>
<b>Sr. No.</b>	<b>Topic</b>
<b>1.</b>	<b>3D Engineering Cad Design:</b> <ul style="list-style-type: none"> <li>• Application Menu and tools</li> <li>• 3D App Spline and Nurbs in Construction</li> <li>• Creating geometry for engineering</li> <li>• Understanding cross section of 3D Engineering design</li> <li>• Function and form concept design</li> <li>• 3D Multi component design</li> <li>• 3D Embedded Design</li> <li>• Using testing software analysis of design</li> </ul>
<b>2.</b>	<b>3D Printing:</b> <ul style="list-style-type: none"> <li>• Meaning</li> <li>• Types of machines</li> <li>• Components – Nozzle, plate, Feeder Heater.</li> <li>• Build Area – Meaning</li> <li>• Additive vs Subtractive</li> <li>• Legacy – of Additive printing</li> <li>• Apps used in 3D printing</li> </ul>
<b>3.</b>	<b>Materials :</b> <p>3D Plastic Material – Classification of Plastic Material</p> <ul style="list-style-type: none"> <li>• Uses of material of Metals</li> <li>• <b>3D Metal – Classification</b></li> <li>• Uses of 3D material</li> <li>• Qualities of recycled material.</li> <li>• 3D Plastic – Sources of Plastic</li> </ul>
<b>4.</b>	<b>Machine :</b> <ul style="list-style-type: none"> <li>• Introduction to various types of 3D Machine</li> <li>• Scope and limitation</li> <li>• Machine and its industry specific needs</li> </ul>
<b>5.</b>	<b>Material:</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Various types of materials &amp; their uses</li> </ul>
<b>6.</b>	<b>Material Limitation:</b> <ul style="list-style-type: none"> <li>• Plastic– meaning and types</li> <li>• Plastic Materials used in industry and consumer printing</li> <li>• Metal – meaning and types</li> <li>• Metal Materials used in industry and consumer printing</li> </ul>
<b>7.</b>	<b>3D New material:</b> <ul style="list-style-type: none"> <li>• Definition</li> <li>• Materials compound organic and combined</li> <li>• Uses of dual material and dual head Printing</li> <li>• Choosing for industry specific Materials in metal and Plastics</li> </ul>

<b>8.</b>	<b>Types of Industry which use in 3D design and Printing</b>
	<ul style="list-style-type: none"> <li>• Aerospace</li> <li>• Defense</li> <li>• Dental</li> <li>• Automotive</li> </ul>

## **Theory – II - Elements of Design & Manufacturing in 3D printing**

<b>1.</b>	<b>Design :</b>
	<ul style="list-style-type: none"> <li>• Concepts and Ideas</li> <li>• Collaborative nature of design</li> <li>• Form and function of design</li> <li>• Choosing a material for design</li> <li>• Choosing an application for design</li> <li>• Converting an idea to engineering design</li> <li>• Limitation of analogue design</li> </ul>
<b>2.</b>	<b>Application :</b>
	<ul style="list-style-type: none"> <li>• 3D Software's for Designing</li> <li>• Free 3D software and their use and limitation</li> <li>• 3D Commercial Software their use and limitation</li> <li>• Various Geometry and its implication In 3D designing</li> <li>• File generation in native 3D application</li> <li>• File conversion for universal Printing in 3D Printer</li> <li>• Process of conversion for 3D printing</li> </ul>
<b>3.</b>	<b>3D Design and Prototyping:</b>
	<ul style="list-style-type: none"> <li>• Introduction to Digital Design</li> <li>• Design thinking in 3D Engineering</li> <li>• Digital Design and 3D printing</li> <li>• Design for end use by consumer products in 3d printing</li> <li>• Study of a typical engineering design vs 3D Design</li> <li>• Study of Commercial / Consumer Design in 3D Printing</li> </ul>
<b>4.</b>	<b>Print process:</b>
	<ul style="list-style-type: none"> <li>• Introduction</li> <li>• Various les generated for 3D printing</li> <li>• Pre production le process and export</li> <li>• Print les assembly</li> <li>• Conversion space for print optimisation</li> <li>• Units of area and volume</li> </ul>
<b>5.</b>	<b>Build Guidelines :</b>
	<ul style="list-style-type: none"> <li>• De nition</li> <li>• Plain gures</li> <li>• Areas of simple gures and polygon</li> <li>• Volumes of solids – cylinder, prism etc.</li> </ul>

<b>6.</b>	<b>Build of 3D walls:</b>
	<ul style="list-style-type: none"> <li>• Definition of 3D walls</li> <li>• Types of Build walls in 3d Design</li> </ul>
<b>7.</b>	<b>3D Engineering Drawing :</b>
	<ul style="list-style-type: none"> <li>• Nurbs</li> <li>• Spline</li> <li>• Facet Behavior in design</li> <li>• Curves globes and curves in design</li> <li>• Build times in volume and various design</li> <li>• Optimising Build</li> </ul>
<b>8.</b>	<b>Commercial Product in 3D design:</b>
	<ul style="list-style-type: none"> <li>• Jewellery</li> <li>• Decorative Architecture</li> <li>• Miniature statue</li> <li>• Popular comic character</li> <li>• Religious Icons</li> </ul>
<b>9.</b>	<b>3D design and Printing in Engineering and Mfg.</b>
	<ul style="list-style-type: none"> <li>• Legacy Automotive enhancement</li> <li>• Interior design</li> <li>• Machine gears motors and chassis</li> <li>• New vehicle concepts</li> <li>• New engineering tools</li> </ul>

<b>Practical - I - Printing a 3D File</b>	
<b>Sr. No.</b>	<b>Topic</b>
1.	Prepare and Repair Your File for 3D Printing
2.	Make your 3D model printable
3.	Choose Material-and Design consideration for 3D Printing
4.	Choose a project which will have Mechanical testing-3d-printed-parts
5.	Print it for testing Form and Fit and Design testing

## Machinery / Computers For One Batch

Sr. No.	Name	Qty.
Sr. No. 1	<b>Computers-</b> 18.5 inch Monitor Intel Pentium Dual Core 4 GB Memory 500 GB HDD	06
Sr. No. 2	<b>Software 3D applications and utilities</b> SolidWorks Rhino Nettfabb Pro	06
Sr. No. 1	<b>3D Printer</b> (Large Build size) FDM printers	2.
Sr. No. 2	Server	1.
Sr. No. 3	Wi -Fi Connection - 4MBS	1.
Sr. No. 4	2 KVA UPS	1
Sr. No. 5	Hand Held 3D Scanner	1.
Sr. No. 6	Furniture Chairs / Cabinets and Fixture	As per requirements
Sr. No. 7	3D printing and Spare / Printer Head	
Sr. No. 8	ABS and PLA Filaments	10 Spools

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