

**FR. Conceicao Rodrigues College of Engineering**  
 Father Agnel Ashram, Bandstand, Bandra-west, Mumbai-50  
**Department of Production Engineering**

**T.E. (Production) (semester V) (2020-2021)**

**Theory Lecture Plan**

**Subject: CAD/CAM/CIM (PEC504)**

**Credits-04**

**Faculty: Dr. A.B.Rane**

**Syllabus.**

Module	Contents	Hrs.
01	<b>Computer Aided Design:</b> 1.1 <b>Introduction</b> : Need and Utility of CAD systems in industry, Product Cycle, Definition of CAD tools based on their Constituents and Implementation in a design environment. 1.2 <b>CAD Hardware</b> : Types of systems, system considerations, I/O devices, Hardware Integration & Networking.	04
02	<b>Computer Graphics :</b> Pixel plotting, Scan conversions of lines & circuits, 2D & 3D transformation, 2D Viewing and clipping. Parallel Projection. Elementary treatment of Hidden lines and surfaces. Cubic spines Bezier curves & B- spines, Animation and Color models.	10
03	<b>Solid Modeling :</b> Types of representation of solid models, interactive tools available with solid modeling software's. Introduction to surface modeling. <b>CAD DATA Exchange</b> : File Structure and format of IGES,STEP and DXF	05
04	<b>Introduction :</b> Elements of CAM system, Computer Numerical control of Machine Tools, Fundamental elements of CNC, Benefits of CNC, Computer control concepts, Data processing units & Binary calculation. <b>Basics of control systems:</b> Motion controller, Interpolation-Linear & Circular, Positioning & contouring control loops, Incremental & Absolute system, DNC & CNC systems and Adaptive control system. <b>CNC Hardware Basics:</b> CNC drives, Spindle design, Actuation and Feedback devices	10
05	<b>CNC Programming :</b> Introduction to CNC Lathe & Milling, Touch probe system, Tool length, nose radius & Diameter compensation, Turning & Machining centre programming, CNC part programming using ISO controllers, Canned cycles, Looping Jumping Subroutines Macros, Parametric programming, Computer aided part	11

	programming using APT and Post processing.	
<b>06</b>	<p><b>CIM :</b> Computer applications in manufacturing, Automation and Integrated Production management systems. Automated Material handling systems, Conveyors, AVG, AS/RS, GT, FMS, Automated inspection procedure, Distributed Numerical control &amp; Benefits of CIM and implementation &amp; computer aided shop floor control system. Concept of “Ghost” factory.</p> <p><b>FEA:</b> Introduction, Stress and Equilibrium, Boundary Condition, Strain – Displacement Relations, Stress Strain Relation, Potential Energy. One Dimensional Problem: Finite Element Modelling, Coordinate Potential Energy Approach, Galerkin Approach, Assembly of Global Stiffness Matrix, Properties of Stiffness Matrix, Finite Element Equations. Trusses: Introduction, 2D Trusses, Assembly of Global Stiffness Matrix.</p>	<b>10</b>

**CO Statements.**

PEC504.1: Student will develop expertise in computer aided manufacturing.

PEC504.2: Student can demonstrate basic concepts of control system.

PEC504.3: Student can formulate code for performing task in CNC.

**CO-PO-PSO Mapping.**

CO# / PO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEC504.1	2	0	0	-	-	-	-	-	-	-	-	0
PEC504.2	2	0	0	-	-	-	-	-	-	-	-	0
PEC504.3	2	2	2	-	3	-	-	-	-	-	-	2

CO# / PSO#	PSO1	PSO2
PEC504.1	2	-
PEC504.2	2	-
PEC504.3	2	-

**CO Assessment**

Final CO achievement = 80 % of Direct assessment + 20 % of Indirect assessment

Direct assessment = 60 % of UT + 40 % of End semester result

In-direct assessment = Course exit survey

**Curriculum Gap/Content beyond syllabus (if any).**

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### Lecture Plan

<b>Week No.</b>	<b>Topics</b>	<b>Module</b>	<b>Hours</b>
<b><u>Week 1</u></b> (06/7/2020 to 11/7/2020)	Nil	4	0
<b><u>Week 2</u></b> (13/7/2020 to 18/7/2020)	Course objectives, Course outcomes, Study material, Scheme etc. Elements of CAM system, Computer Numerical control of Machine Tools.	4	2
<b><u>Week 3</u></b> (20/7/2020 to 25/7/2020)	Fundamental elements of CNC, Benefits of CNC, Computer control concepts, Data processing units & Binary calculation.	4	2
<b><u>Week 4</u></b> (27/7/2020 to 1/8/2020)	Motion controller, Interpolation-Linear & Circular, Positioning & Contouring control loops,	4	2
<b><u>Week 5</u></b> (03/8/2020 to 8/8/2020)	Incremental & Absolute system, DNC & CNC systems and Adaptive control system.	4	2
<b><u>Week 6</u></b> (10/8/2020 to 15/8/2020)	CNC drives, Spindle design, Actuation and Feedback devices.	4	2
<b><u>Week 7</u></b> (17/8/2020 to 22/8/2020)	Introduction to CNC Lathe & Milling, Touch probe system.	5	2
<b><u>Week 8</u></b> (24/8/2020 to 29/8/2020)	Tool length nose radius & Diameter compensation, Turning & Machining centre programming,	5	1
<b><u>Week 9</u></b> (31/8/2020 to 5/9/2020)	CNC part programming using ISO controllers, Canned cycles, Looping Jumping Subroutines Macros,	5	2
<b><u>Week 10</u></b> (7/9/2020 to 12/9/2020)	CNC part programming using ISO controllers, Canned cycles, Looping Jumping Subroutines Macros,	5	2
<b><u>Week 11</u></b> (14/9/2020 to 19/9/2020)	CNC part programming using ISO controllers, Canned cycles, Looping Jumping Subroutines Macros,	5	2
<b><u>Week 12</u></b> (21/9/2020 to 26/9/2020)	<b>Unit Test 1</b>		

<b><u>Week 13</u></b> (28/9/2020 to 3/10/2020)	Computer aided part programming using APT and Post processing. Computer applications in manufacturing.	<b>5</b>	<b>2</b>
<b><u>Week 14</u></b> (5/10/2020 to 10/10/2020)	Computer applications in manufacturing, Automation and Integrated Production management systems. Automated Material handling systems,	<b>5</b>	<b>2</b>
<b><u>Week 15</u></b> (12/10/2020 to 17/10/2020)	Conveyors, Distributed numerical control, Benefits of CIM and implementation, computer aided shop floor system.	<b>6</b>	<b>1</b>
<b><u>Week 16</u></b> (19/10/2020 to 24/10/2020)	<b>AVG, AS/RS, GT</b>	<b>6</b>	<b>2</b>
<b><u>Week 17</u></b> (26/10/2020 to 31/10/2020)	Automated inspection procedure	<b>6</b>	<b>2</b>
<b><u>Week 18</u></b> (2/11/2020 to 7/11/2020)	<b>FMS</b>	<b>6</b>	<b>2</b>
<b><u>Week 19</u></b> (9/11/2020 to 14/11/2020)	Concept of “Ghost” factory. Revision	<b>6</b>	<b>1</b>
<b><u>Week 20</u></b> (16/11/2020 to 21/11/2020)	<b>Doubt session, QP solving</b>	<b>6</b>	<b>1</b>
<b><u>Week 21</u></b> (23/11/2020 to 28/11/2020)	<b>Unit Test 2 Term End</b>		