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| **FR. Conceicao Rodrigues College Of Engineering**  Father Agnel Ashram, Bandstand, Bandra-west, Mumbai-50  **Department of Production Engineering**    **T.E. (Production) (semester VII)  (July 2022 – Dec. 2022)**  **Lecture Plan**  **Subject: Computer Aided Engineering (PEC802)                                      Credits-03** |
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1. **Syllabus.**

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| **Module** | **Details** | **Hrs.** |
| **01** | **Computer Aided Design:**   * 1. I**ntroduction** : Need and Utility of CAD systems in industry, Product Cycle, Definition of CAD tools based on their Constituents and Implementation in a design environment.   2. **CAD Hardware*:*** Types of systems, system considerations, I/O devices, Hardware   Integration & Networking. | **04** |
| **02** | **Computer Graphics** :  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. | **08** |
| **03** | **Solid Modeling :**  Types of representation of solid models, interactive tools available with solid modeling software’s. Introduction to surface modeling.  **CAD DATA Exchange** : File Structure and format of IGES,STEP and DXF | **05** |
| **04** | **FEA:**  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. | **10** |
| **05** | **CIM :**  Introduction, Evolution, Objectives, CIM Hardware and Software, CIM Benefits,  Nature and role of the elements of CIM, Identifying CIM needs, Data base requirements of CIM, Role of CAD/CAM in CIM, Obstacles to Computer Integrated Manufacturing, Concept of the future CIM systems, Socio -techno- economic aspects  of CIM. Introduction to various aspects of Industry 4.0. | **04** |
| **06** | **Automated Material handling systems:**  Flexible manufacturing system: Components, layouts, advantages Automated guided vehicles: advantages, types, guidance systems Group technology (GT): Part families, Parts Classification and Coding Automated storage/ Retrieval system (AS/RS) Concept  of “Ghost” factory. | **08** |

1. **CO Statements.**

Learner will be able to

PEC802.1: Understand software configuration of graphic packages.

PEC802.2: Understand use of Computer graphics in design.

PEC802.3: Solve physical and engineering problems with emphasis on Structural and Thermal

Engineering applications.

PEC802.4: Understand the concept of Computer Integrated Manufacturing.

1. **CO-PO-PSO Mapping.**

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| CO# / PO# | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| PEC802.1 | 3 | 2 |  | - | - | - | - | - | - | - | - | 2 |
| PEC802.2 | 3 | 2 |  | - | - | - | - | - | - | - | - | 2 |
| PEC802.3 | 3 | 2 |  | - | - | - | - | - | - | - | - | 2 |
| PEC802.4 | 3 | - |  | - | - | - | - | - | - | - | - | 2 |

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| CO# / PSO# | PSO1 | PSO2 |
| PEC802.1 | 3 | - |
| PEC802.2 | 3 | - |
| PEC802.3 | 3 | - |
| PEC802.4 | 3 | - |

1. **CO Assessment tools with target.**

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| **Co Statement #** | **Target for Assessment Tools** | | |
| **Unit Test** | **End Semester Exam** | **Course Exit Survey** |
| PEC802.1 | 50% | 40% | 60% |
| PEC802.2 | 50% | 40% | 60% |
| PEC802.3 | 50% | 40% | 60% |
| PEC802.4 | 50% | 40% | 60% |

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

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

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1. Lecture Plan.

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| **Week No.** | **Topics** | **Module** | **Hours** |
| **Week 1**  (18/7/2022 to 22/7/2022) | **Computer Aided Design:**  I**ntroduction** : 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** | **3** |
| **Week 2**  (25/7/2021 to 29/7/2021) | **CAD Hardware*:*** Types of systems, system considerations, I/O devices, Hardware Integration & Networking. | **1** | **3** |
| **Week 3**  (1/8/2021 to 5/8/2021) | **Computer Graphics** :  Pixel plotting, Scan conversions of lines & circuits, 2D & 3D transformation, 2D Viewing and clipping. Parallel Projection. | **2** | **3** |
| **Week 4**  (8/8/2021 to 12/8/2021) | Elementary treatment of Hidden lines and surfaces. Cubic spines Bezier curves & B- spines, Animation and Color models. | **2** | **3** |
| **Week 5**  (15/8/2021 to 20/8/2021) | **Solid Modeling :**  Types of representation of solid models, interactive tools available with solid modeling software’s. Introduction to surface modeling | **3** | **3** |
| **Week 6**  (22/8/2021 to 26/8/2021) | **CAD DATA Exchange** : File Structure and format of IGES,STEP and DXF  **FEA:** Introduction, Stress and Equilibrium, Boundary Condition | **3** | **3** |
| **Week 7**  (29/8/2021 to 3/9/2021) | **Academic break** |  |  |
| **Week 8**  (5/09/2021 to 9/9/2021) | Strain – Displacement Relations, Stress Strain Relation, Potential Energy. | **4** | **3** |
| **Week 9**  (12/09/2021 to 16/9/2021) | UT1 |  |  |
| **Week 10**  (19/09/2021 to 23/09/2021) | One Dimensional Problem: Finite Element Modelling, Coordinate Potential Energy Approach, Galerkin Approach, Assembly of Global Stiffness Matrix | **4** | **3** |
| **Week 11**  (26/9/2021 to 30/9/2021)) | Properties of Stiffness Matrix, Finite Element Equations.  Trusses: Introduction, 2D Trusses, Assembly of Global Stiffness Matrix. | **5** | **3** |
| **Week 12**  (3/10/2021 to 7/10/2021) | **CIM :**  Introduction, Evolution, Objectives, CIM Hardware and Software, CIM Benefits, Nature and role of the elements of CIM, Identifying CIM needs, Data base requirements of CIM, Role of CAD/CAM in CIM, Obstacles to Computer Integrated Manufacturing, Concept of the future CIM systems, Socio -techno- economic aspects of CIM. Introduction to various aspects of Industry 4.0. | **5** | **3** |
| **Week 13**  (10/10/2021 to 14/10/2021) | **Automated Material handling systems:**  Flexible manufacturing system: Components, layouts, advantages Automated guided vehicles: advantages, types, guidance systems | **6** | **3** |
| **Week 14**  (1710/2021 to 21/10/2021) | UT2 |  |  |
| **Week 15**  (24/10/2021 to 29/10/2021) | Group technology (GT): Part families, Parts Classification and Coding Automated storage/ Retrieval system (AS/RS) Concept  of “Ghost” factory. | **6** | **3** |