Minor in "Innovation and Product Development"

Institute has decided to offer a new Minor Program in Innovation and Product Development from the Academic Year 2024-25.

1. Interested students are advised to form teams and find out their mentors from institute and industry in advance.

2. B.Tech./Dual Degree Students who have completed 4th / 5th Semester, can apply for Pre-registration in 5th or 6th Semester

3. Students who have CGPA more than 7.00 are eligible to apply for pre-registration.

4. Preferable students should form a multi-disciplinary group to form the team.

5. Minimum two and maximum three students are required in a group to form a team.

6. Students to submit pre-registration form to their coordinator.

7. Registration will be opened soon.

The modality of the minor program is given below in **Annexure- I**, Pre-registration FORM in **Annexure- II** and Course Work- in **Annexure-III** for your information and necessary action.

Modalities (Regulations) of Minor programme in "Innovation and Product Development"

1. Preamble:

Students with innovative attitude try to develop certain technology-intensive product. Many of them take part in technical competitions/awards. Some of them win the prize and some of them do not. To encourage such students and to enhance their innovation prowess, a minor degree in "Innovation and Product Development" can be awarded to undergraduate students. Students with this Minor will become engineers equipped with both technical depth from their own Pillar and ability to lead and develop new products, methodologies. Such attitude towards building innovative products will lead to start-ups and entrepreneurship. Students inclined towards developing a certain product can use the opportunity to earn minor degree, moreover, faculty members involved in developing products and/or start-ups can engage such students with them.

Expects students to develop a simple product, sub-product, device or tool in a team-based workshop environment, through a concept generation, prototyping and testing in relevant environment, all informed by the needs of the intended user population.

2. Eligibility:

- Students with CGPA $\geq$ 7.0 are eligible.
- It is expected that students should form a multi-disciplinary group to develop a product.
- Team must have minimum two and maximum three students. Students in a team preferably from different disciplines, although not mandatory.

3. Time-line:

- The duration of minor is divided into two parts i.e., pre-registration and registration.
- Pre-registration starts after the end of 4th or 5th semester (i.e., 5th and/or 6th semester is the pre-registration period). Registration period is from 7-8th semester.

4. Pre-registration (ideation, preliminary work stage: 5-6th semester or 6th semester):

- Pre-registration starts in 5th or 6th Semester. For pre-registration, teams need to submit statement of purpose, clearly defined objective(s) related to intended product.
- Teams need to find out mentor(s) (faculty members from the Institute) in the area of intended product. Apart from faculty member, it is desirable to have mentor from Industry. Mentor(s) will act as guide for the team.
- **Course work requirement**: Student must have passed course titled "Product design and development" in or before 5th semester. It is desired that industry professionals or professors of practice to contribute at least 5-10 hours of teaching.

5. Assessment at the end of pre-registration period (i.e., 6th Semester):

- At the end of 6th Semester, all the teams have to undergone an evaluation (screening) by a single panel. After evaluation, panel will send the recommendation on how many teams would continue for minor program.

- Assessment criterion shall be based on novelty of idea, market survey and preliminary work such as design/drawing/simulation, etc. Teams need to show product specifications, deliverables, cost estimation, etc.

- The only successful teams will be allowed to continue the registration in 7th Semester.

- Credits will be assigned to only successful teams.

6. Registration (Execution stage: 7-8th semester):

- Successful teams of the previous stage will register for minor in 7th semester.

- From 7th semester onwards, students shall carry out the work further on the intended product.

- At the beginning of the 7th semester, the selected teams will submit methodology, time-line (bar chart) of the execution of the intended product.

7. Assessment during the registration period:

- Assessment of the progress will done at the end of each semester (i.e., 7-8th semester). Students will be assigned the grades based on the progress in the product development process.

- Assessment criterion shall be based on following parameters:

  o Innovation in design and innovation in execution (working prototype).

  o Core competencies that students should demonstrate in product design and development (creativity, problem-solving, technical proficiency, teamwork)

  o Assessment criterion shall be based on industry relevance of the product showing the real-world scenarios.

  o Patent search report and detailed comparison of product with available products in the market.

- It is expected that students should develop the product beyond TRL4 but not below TRL3 at the end of 8th semester.

- Minor degree awarded with remark of TRL.

8. Credit assignment:

Credit assigned to course work	3
Credit assigned after pre-registration (only for successful teams)	3
Credit assigned in 7th semester	4
Credit assigned in 8th semester	8
Total credits	**18**

- Every student of the team will be required to earn minimum "C" grade in every evaluation to continue in 'minor'.

9. For Dual Degree students:

- If all the team members are from dual degree, the pre-registration can be shifted by one semester. Moreover, the registration period can be of three semesters.

10. Funding opportunities for product development:

- Design innovation center, faculty's R&D grants, Corporate Social Responsibilities Cell, School fund, Research & Entrepreneurship park.

11. Summer internship:

- It is expected that students should spent summer/winter internship period in developing the product or in relevant industry.

12. Assessment forms:

Evaluation Sheet – Screening (at the end of 6th semester)

Name	Roll No.	Innovation in concept and novelty of idea (15 marks	Identified problem and its relevance to industry/society (15 marks)	Market research and identified gaps (15 marks)	Proposed solution and team compete-nce (15 marks)	Product develop-ment approach (20 marks)	Relevant skills learned (20 marks)	Total marks (100)	Qualified / Not Qualified

Grade Assigned to Qualified Students (Grade must be ≥ "C")

Name of Students	Roll No. of students	Marks (out of 100)	Grade

Evaluation Sheet – 7th semester

Name	Roll no.	Innovation in Design (20 marks)	Product development approach (20 marks)	Current stage of product and its performance (30 marks)	Relevant skills learned (30 marks)	Total marks (100)	Grades *

Evaluation Sheet – 8th semester

Name	Roll no.	Current stage of product and its performance (30 marks)	Relevant skills learned (30 marks)	Patent search report (20 marks)	Potential for IP generation (20 marks)	Total marks (100)	Grades *

* Every student of the team will be required to earn minimum "C" grade in every evaluation to continue in 'minor'.

Minor programme in "Innovation and Product Development"

Pre-registration Form

1. **Name of product (intended)**:

2. **Type of product (domestic, industrial, agriculture, etc.)**:

3. **Team**:

Sr. No.	Name of student	Roll No.	School/Discipline

4. **Details of Mentor(s)**:

Sr. No.	Name	Organization	Email address

5. **Statement of purpose:**

6. **Objectives:**

7. **Novelty/what's new:**

8. **Approximate cost:**

Signature of Coordinator

Course Syllabus

Subject Code: ME3L----	Subject name: Product Design and Development	L-T-P: 3-0-0	Credit:3
Pre-Requisite(s): None			

Design methodology and design philosophy - types of designs, design models, concurrent engineering, product life cycle, product line;

Design Teams - Organizations & product planning;

Need Analysis & Scope - mission statement, customer study, Kano diagram;

Establishing Product function - functional decomposition, FAST and SOP, function structure;

Product tear down - reverse engineering, product specification, QFD;

Generation and evaluation of concepts - TRIZ, Decision matrix etc.,

Embodiment design – product architecture, configuration, parametric design, system approach and other consideration of embodiment design;

Industrial design – asthetics and ergonomics aspects of the product design, Value engineering, failure mode and effect analysis;

Manufacturability assessments of given design, product costing and bill of materials, process planning for components and assembly, product manufacturing and testing;

Case studies in different domains/disciplines.

Text Books:

1. Karl T. Ulrich and Steven D. Eppinger, "Product Design and Development" Tata McGraw Hill, 2007.
2. Kevin Otto and Kristin Wood, "Product design" – Pearson, 2004.

Reference Books:

1. George E. Dieter, "Engineering Design" – McGraw Hill, 2000.
2. Paul J. G, "Form, Function and Design" Dover Publication, 1994.
3. Kurt Rowland, " The Development of Shape" Ginn and Company, 1994.
4. NASA Systems Engineering Handbook, 12th Media Services Publishers, 2017
5. Eric Gamma, Design Patterns: Elements of Reusable object oriented software, 2015.
6. David G. Ulman, "The mechanical Design Process" – McGraw Hill, 2003.