

**M.Tech. Program from Department of Mechanical Engineering**  
**M. Tech. in Advanced Manufacturing Technology**

| <b>Program Learning Objectives:</b>  | <b>Program Learning Outcomes:</b>   |
|--|---|
| <p><b>Program Goal 1:</b><br/>The graduates will be current in the knowledge of concepts and practices of material removal processes.</p>  | <p>Program Learning Outcome 1a:<br/>Appraise the mechanism of conventional and advanced material removal processes.<br/>Program Learning Outcome 1b:<br/>Identify and critically evaluate the process performance of various basic and advanced machining processes.</p>  |
| <p><b>Program Goal 2:</b><br/>The graduates will possess the concepts of materials deformation and various forming processes.</p>  | <p>Program Learning Outcome 2:<br/>Critically appraise and analyze the deformation behavior during bulk and sheet material forming processes.</p>   |
| <p><b>Program Goal 3:</b><br/>The graduates will be current in the knowledge of advanced materials and their processing techniques, damage and failure of materials.</p>               | <p>Program Learning Outcome 3a:<br/>Appraise the behavior and processing of advanced materials.<br/>Program Learning Outcome 3b:<br/>Understand and identify the damage and failure of materials.</p>   |
| <p><b>Program Goal 4:</b><br/>The graduates will be enriched with the various advanced concepts of manufacturing processes to meet the present and future demands of the industry.</p> | <p>Program Learning Outcome 4:<br/>Appraise the recent industrial demands and identify the manufacturing processes and associated strategies to meet the need.</p>  |
| <p><b>Program Goal 5:</b><br/>The graduates will possess the state-of-the art practical, and numerical approach for the analysis of manufacturing processes.</p>                       | <p>Program Learning Outcome 5a:<br/>Acquire the appropriate engineering skill and knowledge pertaining to processes, characterization of products or parts.<br/>Program Learning Outcome 5b:<br/>Possess the computational, and analytical expertise required for the analysis of manufacturing processes with focus in industrial and research applications.</p> |

| Sl. No.      | Subject Code | SEMESTER I                       | L         | T        | P        | C           |
|--------------|--------------|----------------------------------|-----------|----------|----------|-------------|
| 1.           | HS5111       | Technical Writing and Soft Skill | 1         | 2        | 2        | 4           |
| 2.           | ME5101       | Advanced Engineering Mathematics | 3         | 1        | 0        | 4           |
| 3.           | ME5103       | Finite Element Analysis          | 3         | 0        | 0        | 3           |
| 4.           | ME5108       | Deformation-based Manufacturing  | 3         | 0        | 0        | 3           |
| 5.           | ME5109       | Manufacturing Lab - I            | 0         | 0        | 3        | 1.5         |
| 6.           | ME61XX       | DE-I                             | 3         | 0        | 0        | 3           |
| 7.           | ME61XX       | DE-II                            | 3         | 0        | 0        | 3           |
| 8.           | XX61PQ       | IDE                              | 3         | 0        | 0        | 3           |
| <b>TOTAL</b> |              |                                  | <b>19</b> | <b>3</b> | <b>5</b> | <b>24.5</b> |

**IDE (Inter Disciplinary electives)** in the curriculum aims to create multitasking professionals/ scientists with learning opportunities for students across disciplines/aptitude of their choice by opting level (5 or 6) electives, as appropriate, listed in the approved curriculum.

| Sl. No.      | Subject Code | SEMESTER II                        | L         | T        | P        | C           |
|--------------|--------------|------------------------------------|-----------|----------|----------|-------------|
| 1.           | ME5201       | Advanced Engineering Software Lab  | 1         | 0        | 4        | 3           |
| 2.           | ME5203       | Measurement and Instrumentation    | 3         | 0        | 0        | 3           |
| 3.           | ME5207       | Solidification-based Manufacturing | 3         | 1        | 0        | 4           |
| 4.           | ME5208       | Manufacturing Lab - II             | 0         | 0        | 3        | 1.5         |
| 5.           | ME62XX       | DE-III                             | 3         | 0        | 0        | 3           |
| 6.           | ME62XX       | DE-IV                              | 3         | 0        | 0        | 3           |
| 7.           | RM6201       | Research Methodology               | 3         | 1        | 0        | 4           |
| 8.           | IK6201       | IKS                                | 3         | 0        | 0        | 3           |
| <b>TOTAL</b> |              |                                    | <b>19</b> | <b>2</b> | <b>7</b> | <b>24.5</b> |

| Sl. No.      | Subject Code | SEMESTER III                      | L        | T        | P         | C         |
|--------------|--------------|-----------------------------------|----------|----------|-----------|-----------|
| 1.           | ME6198       | Summer Internship / Mini Project* | 0        | 0        | 12        | 3         |
| 2.           | ME6199       | Project I**                       | 0        | 0        | 30        | 15        |
| <b>TOTAL</b> |              |                                   | <b>0</b> | <b>0</b> | <b>42</b> | <b>18</b> |

**\*Note: Summer Internship (Credit based)**

(i) Summer internship (\*) period of at least 60 days' (8 weeks) duration begins in the intervening summer vacation between Semester II and III. It may be pursued in industry / R&D / Academic Institutions including IIT Patna. The evaluation would comprise **combined grading based on host supervisor evaluation, project internship report after plagiarism check and seminar presentation at the Department (DAPC to coordinate)** with equal weightage of each of the three components stated herein.

(ii) Further, on return from 60 days internship, students will be evaluated for internship work through combined grading based on host supervisor evaluation, project internship report after plagiarism check, and presentation evaluation by the parent department with equal weightage of each component.

**\*\* Note: M. Tech. Project outside the Institute:** A project-based internship may be permitted in industries/academia (outside IITP) in 3rd or 4th semester in accordance with

academic regulations. In the III<sup>rd</sup> Semester, students can opt for a semester long M. Tech. project subject to confirmation from an Institution of repute for research project, on the assigned topic at any external Institution (Industry / R&D lab / Academic Institutions) based on recommendation of the DAPC provided:

(i.) The project topic is well defined in objective, methodology and expected outcome through an abstract and statement of the student pertaining to expertise with the proposed supervisor of the host institution and consent of the faculty member from the concerned department at IIT Patna as joint supervisor.

(ii.) The consent of both the supervisors (external and institutional) on project topic is obtained a priori and forwarded to the academic section through DAPC for approval by the competent authority for office record in the personal file of the candidate.

(iii.) Confidentiality and Non Disclosure Agreement (NDA) between the two organizations with clarity on intellectual property rights (IPR) must be executed prior to initiating the semester long project assignment and committing the same to external organization and vice versa.

(iv.) The evaluation in each semester at Institute would be mandatory and the report from Industry Supervisor will be given due weightage as defined in the Academic Regulation. Further, the final assessment of the project work on completion will be done with equal weightage for assessment of the host and Institute supervisors, project report after **plagiarism check**. The award of grade would comprise **combined assessment based on host supervisor evaluation, project report quality and seminar presentation at the Department (DAPC to coordinate)** with equal weightage of each of the components stated herein.

(v.) In case of poor progress of work and / or no contribution from external supervisor, the student need to revert back to the Institute essentially to fulfill the completion of M. Tech. project as envisaged at the time of project allotment. However, the recommendation of DAPC based on progress report and presentation would be mandatory for a final decision by the competent authority.

| Sl. No. | Subject Code | SEMESTER IV  | L        | T        | P         | C         |
|---------|--------------|--------------|----------|----------|-----------|-----------|
| 1.      | ME6299       | Project II   | 0        | 0        | 42        | 21        |
|         |              | <b>TOTAL</b> | <b>0</b> | <b>0</b> | <b>42</b> | <b>21</b> |

**Total Credit from Semester I to IV - 88**

### **ELECTIVE GROUPS**

|                                |
|--------------------------------|
| <b>Department Elective - I</b> |
|--------------------------------|

| Sl. No. | Subject Code | Subject                                  | L | T | P | C |
|---------|--------------|--|---|---|---|---|
| 1.      | ME6102       | Computational Fluid Dynamics             | 3 | 0 | 0 | 3 |
| 2.      | ME6106       | Mobile Robotics                          | 3 | 0 | 0 | 3 |
| 3.      | ME6107       | Digital Manufacturing and Industry 4.0   | 3 | 0 | 0 | 3 |
| 4.      | ME6108       | Wear & Lubrication of Machine Components | 3 | 0 | 0 | 3 |

| Department Elective - II |              |  |   |   |   |   |
|--------------------------|--------------|--|---|---|---|---|
| Sl. No.                  | Subject Code | Subject  | L | T | P | C |
| 1.                       | ME6103       | Continuum Mechanics                            | 3 | 0 | 0 | 3 |
| 2.                       | ME6110       | Biomechanics                                   | 3 | 0 | 0 | 3 |
| 3.                       | ME6111       | Advanced Manufacturing Processes               | 3 | 0 | 0 | 3 |
| 4.                       | ME6112       | Advanced Mechanical Characterisation of Alloys | 3 | 0 | 0 | 3 |

| Department Elective - III |              |   |   |   |   |   |
|---------------------------|--------------|---|---|---|---|---|
| Sl. No.                   | Subject Code | Subject   | L | T | P | C |
| 1.                        | ME6203       | Laser Processing of Materials                         | 3 | 0 | 0 | 3 |
| 2.                        | ME6208       | Robot Motion Planning                                 | 3 | 0 | 0 | 3 |
| 3.                        | ME6214       | Additive Manufacturing of Metals: Theory and Practice | 3 | 0 | 0 | 3 |
| 4.                        | ME6215       | Computer Numerical Controlled Machine Tools           | 3 | 0 | 0 | 3 |

| Department Elective - IV |              |  |   |   |   |   |
|--------------------------|--------------|--|---|---|---|---|
| Sl. No.                  | Subject Code | Subject                                | L | T | P | C |
| 1.                       | ME6210       | Robotics: Advanced Concepts & Analysis | 3 | 0 | 0 | 3 |
| 2.                       | ME6211       | Analysis of Welding Processes          | 3 | 0 | 0 | 3 |
| 3.                       | ME6212       | Fracture and Fatigue                   | 3 | 0 | 0 | 3 |

**Interdisciplinary Elective (IDE) Course for M. Tech. (Available to students other than ME)**

| IDE     |              |   |   |   |   |   |
|---------|--------------|---|---|---|---|---|
| Sl. No. | Subject Code | Subject                                   | L | T | P | C |
| 1.      | ME6113       | Soft Computing Application in Engineering | 3 | 0 | 0 | 3 |



| <b>Sl. No.</b> | <b>Subject Code</b> | <b>SEMESTER II</b>                 | <b>L</b>  | <b>T</b> | <b>P</b> | <b>C</b>    |
|----------------|---------------------|------------------------------------|-----------|----------|----------|-------------|
| 1.             | ME5201              | Advanced Engineering Software Lab  | 1         | 0        | 4        | 3           |
| 2.             | ME5203              | Measurement and Instrumentation    | 3         | 0        | 0        | 3           |
| 3.             | ME5207              | Solidification-based Manufacturing | 3         | 1        | 0        | 4           |
| 4.             | ME5208              | Manufacturing Lab - II             | 0         | 0        | 3        | 1.5         |
| 5.             | ME62XX              | DE-III                             | 3         | 0        | 0        | 3           |
| 6.             | ME62XX              | DE-IV                              | 3         | 0        | 0        | 3           |
| 7.             | RM6201              | Research Methodology               | 3         | 1        | 0        | 4           |
| 8.             | IK6201              | IKS                                | 3         | 0        | 0        | 3           |
|                |                     | <b>TOTAL</b>                       | <b>19</b> | <b>2</b> | <b>7</b> | <b>24.5</b> |