

## B. Tech. Programme from the Department of Mechanical Engineering

### (i) B. Tech. in Mechanical Engineering

Program Learning Objectives:	Program Learning Outcomes:
<p><b>Program Goal 1:</b> Apply basic knowledge of engineering principles to solve technical problems applied to mechanical systems, stress and strain analysis of structures, design of machine elements, control systems to achieve desirable performance and to assess life of mechanical components.</p>	<p><b>Program Learning Outcome 1:</b> The students should be able to apply the principles of Kinematics and Dynamics of Mechanisms, mechanics of solid, system dynamics and control to the engineering problems of societal relevance.</p>
<p><b>Program Goal 2:</b> To impart the ability to model and analyse pertinent transport phenomena based on the fundamental conservations laws of thermodynamics and fluid mechanics.</p>	<p><b>Program Learning Outcome 2:</b> Upon completion of the course, students will possess the capability to design and implement mathematical models and simulation tools specifically tailored to address complex mechanical engineering issues within crucial domains such as energy and the environment.</p>
<p><b>Program Goal 3:</b> The graduates will be possessing the knowledge of concepts and practices of material removal, material forming, material joining, additive manufacturing-based processes, identify damage and failure of material to meet the present and future demands of the industry.</p>	<p><b>Program Learning Outcome 3:</b> The students should gain the knowledge of the behaviour and processing of engineering materials through different conventional and state-of-the-art material subtractive and additive based processes.</p>
<p><b>Program Goal 4:</b> To train the graduates with adequate engineering knowledge to develop skills for solving multi-disciplinary problems and achieving optimal results.</p>	<p><b>Program Learning Outcome 4:</b> The graduates will be able to embrace leadership and collaborative roles for societal, environmental and economic enterprise.</p>

Sl. No.	Subject Code	SEMESTER I	L	T	P	C
1.	MA1101	Calculus and Linear Algebra	3	1	0	4.0
2.	CS1101	Foundations of Programming	3	0	3	4.5
3.	PH1101/PH1201	Physics	3	1	3	5.5
4.	CE1101/CE1201	Engineering Graphics	1	0	3	2.5
5.	EE1101/EE1201	Electrical Sciences	3	0	3	4.5
6.	HS1101	English for Professionals	2	0	1	2.5
<b>TOTAL</b>			<b>15</b>	<b>2</b>	<b>13</b>	<b>23.5</b>

Sl. No.	Subject Code	SEMESTER II	L	T	P	C
1.	MA1201	Probability Theory and Ordinary Differential Equations	3	1	0	4
2.	CS1201	Data Structure	3	0	3	4.5
3.	CH1201/CH1101	Chemistry	3	1	3	5.5
4.	ME1201/ME1101	Mechanical Fabrication	0	0	3	1.5
5.	ME1202/ME1102	Engineering Mechanics	3	1	0	4
6.	IK1201	Indian Knowledge System (IKS)	3	0	0	3
<b>TOTAL</b>			<b>15</b>	<b>3</b>	<b>9</b>	<b>22.5</b>

Sl. No.	Subject Code	SEMESTER III	L	T	P	C
1.	ME2101	Dynamics	3	1	0	4
2.	ME2102	Thermodynamics	3	1	0	4
3.	ME2103	Fluid Mechanics	3	1	2	5
4.	ME2104	Engineering Materials	3	0	2	4
5.	HS21XX	HSS Elective - I	3	0	0	3
<b>TOTAL</b>			<b>15</b>	<b>3</b>	<b>4</b>	<b>20</b>

Sl. No.	Subject Code	SEMESTER IV	L	T	P	C
1.	ME2201	Kinematics and Dynamics of Mechanisms	3	1	2	5
2.	ME2202	Heat and Mass Transfer	3	1	2	5
3.	ME2203	Mechanics of Solids	3	1	0	4
4.	ME2204	Mechanical Measurements and Instrumentation	3	0	2	4
5.	XX22PQ	IDE-I	3	0	0	3
<b>TOTAL</b>			<b>15</b>	<b>3</b>	<b>6</b>	<b>21</b>

Sl. No.	Subject Code	SEMESTER V	L	T	P	C
1.	ME3101	Data Analytics and Machine Learning Tools for Engineers	1	2	1	3.5
2.	ME3102	Design of Machine Elements	3	0	3	4.5
3.	ME3103	Manufacturing Technology- I	3	0	2	4
4.	ME3104	Engineering Software Laboratory	1	0	3	2.5
5.	ME3105	Numerical Methods for Engineers	3	0	0	3
6.	XX31PQ	IDE-II	3	0	0	3
<b>TOTAL</b>			<b>14</b>	<b>2</b>	<b>9</b>	<b>20.5</b>

Sl. No.	Subject Code	SEMESTER VI	L	T	P	C
1.	ME3201	Applied Thermodynamics and Turbomachinery	3	1	2	5
2.	ME3202	System Dynamics and Control	3	1	2	5
3.	ME3203	Manufacturing Technology -II	3	0	3	4.5
4.	ME3204	Industrial Engineering and Operations Research	3	1	0	4
5.	ME3205	Technical Writing and Presentations	0	0	4	2
<b>TOTAL</b>			<b>12</b>	<b>3</b>	<b>11</b>	<b>20.5</b>

Sl. No.	Subject Code	SEMESTER VII	L	T	P	C
1.	ME41XX	Departmental Elective-I	3	0	0	3
2.	ME41XX	Departmental Elective- II	3	0	0	3
3.	XX41PQ	IDE-III	3	0	0	3
4.	HS41PQ	HSS Elective-II	3	0	0	3
5.	ME4198	Summer Internship*	0	0	12	3
6.	ME4199	Project – I	0	0	12	6
<b>TOTAL</b>			<b>12</b>	<b>0</b>	<b>24</b>	<b>21</b>

**\* For specific cases of internship after 6<sup>th</sup> Semester, the performance evaluation would be made on joining the VII<sup>th</sup> Semester and graded accordingly in the VII<sup>th</sup> Semester.**

**Note:**

**a)**

- i. Summer internship (\*) period of at least 60 days' (8 weeks) duration begins in the intervening vacation between semester VI and VII that may be done 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 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.

**b)**

- i. In the VII<sup>th</sup> semester, students can opt for a semester long internship on recommendation of the DAPC and approval of the Competent Authority.
- ii. On approval of semester long internship, at the maximum two courses (properly mapped/aligned syllabus) at par with institute electives may be opted from NPTEL and / or SWAYAM and the other two more should be done at the institute through course overloading in any other semester (either before or after the internship) and/or during following summer semester.

- iii. The candidates opting two courses from NPTEL and / or SWAYAM would be required to appear in the examination at the Institute as scheduled in the Academic Calendar.

Sl. No.	Subject Code	SEMESTER VIII	L	T	P	C
1.	ME42XX	Departmental Elective – III	3	0	0	3
2.	ME42XX	Departmental Elective – IV	3	0	0	3
3.	ME42XX	Departmental Elective – V	3	0	0	3
4.	ME4299	Project – II	0	0	16	8
<b>TOTAL</b>			<b>9</b>	<b>0</b>	<b>16</b>	<b>17</b>
<b>GRAND TOTAL (Semester I to VIII)</b>			<b>166</b>			

### ELECTIVE GROUPS

Sl. No.	Subject Code	Department Electives - I	L	T	P	C
1.	ME4101	<u>Tribology and Surface Engineering</u>	3	0	0	3
2.	ME4102	Basics of Computational Fluid Dynamics	3	0	0	3
3.	ME4103	<u>Industrial Automation</u>	3	0	0	3

Sl. No.	Subject Code	Department Electives - II	L	T	P	C
1.	ME4104	<u>Vehicle Dynamics</u>	3	0	0	3
2.	ME4105	<u>Mathematical Modelling of Computer Aided Design</u>	3	0	0	3
3.	ME4106	<u>Energy Engineering</u>	3	0	0	3

Sl. No.	Subject Code	Department Electives - III	L	T	P	C
1.	ME4201	<u>Finite Element Method</u>	3	0	0	3
2.	ME4202	Refrigeration and Cryogenics	3	0	0	3
3.	ME4203	<u>Mechanics, Processing and failure of Composite Materials</u>	3	0	0	3

Sl. No.	Subject Code	Department Electives - IV	L	T	P	C
1.	ME4204	Mechanical Characterization of Materials	3	0	0	3
2.	ME4205	Internal Combustion Engines	3	0	0	3
3.	ME4206	<u>Micro-manufacturing</u>	3	0	0	3

Sl. No.	Subject Code	Department Electives - V	L	T	P	C
1.	ME4207	<u>Energy Methods and Variational Principles in Applied Mechanics</u>	3	0	0	3
2.	ME4208	Failure Analysis of Engineering Materials	3	0	0	3
3.	ME4209	<u>Hydraulic Machines</u>	3	0	0	3

**Interdisciplinary Elective (IDE) Courses for B. Tech. (Available to students other than Dept. of ME)**

Sl. No.	Subject Code	Subject Name	L	T	P	C
1.	ME2205	<u>Manufacturing Processes for Metallic Materials</u>	3	0	0	3
2.	ME3106	<u>Automotive Technology</u>	3	0	0	3
3.	ME4103	<u>Nonlinear Dynamics and Chaos</u>	3	0	0	3

**Minor in Thermal Engineering**

Sl. No.	Subject Code	Subject Name	L	T	P	C
1.	ME2102	Thermodynamics	3	1	0	4
2.	ME2202	Heat and Mass Transfer	3	1	2	5
3.	ME3104	Engineering Software Laboratory	1	0	3	2.5
4.	ME3201	Applied Thermodynamics and Turbomachinery	3	1	2	5