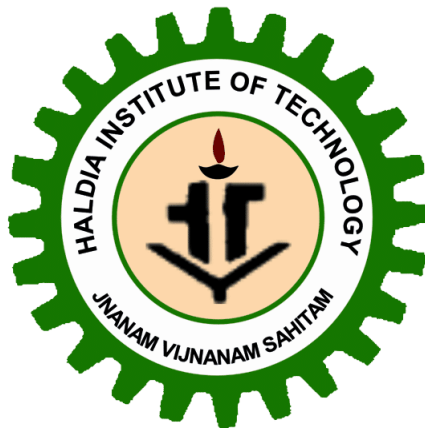


CURRICULUM STRUCTURE FOR BACHELOR OF TECHNOLOGY IN MECHANICAL ENGINEERING

(Applicable from the academic session 2024-2025)



Haldia Institute of Technology

(An Autonomous Institution under Maulana Abul Kalam Azad University
of Technology, West Bengal)

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Syllabus for B. Tech in Mechanical Engineering

(Applicable from the academic session 2024-2025)

The curricula is formed in line with the National Credit Framework (NCrF)
as proposed in NEP 2020

SEMESTER-I

THEORY							
Sl No.	Course Code	Subject Name	Contact period per week			Total	Credit
			L	T	P		
1	BS-M 101	Mathematics-I	3	1	0	4	4
2	BS-PH 101	Physics	3	1	0	4	4
3	ES-EE 101	Basic Elec. & Electro. Engg.	3	1	0	4	4
4	BS-BT 101	Biology for Engineers	2	0	0	2	2
TOTAL THEORY						14	14
PRACTICAL							
5	BS-PH 191	Physics Lab	0	0	3	3	1.5
6	ES-EE 191	Basic Elec. & Electro. Engg. Lab	0	0	3	3	1.5
7	ES-ME 191	Workshop Practice	0	0	3	3	1.5
8	AU 101	NSS	0	0	0	0	0
TOTAL PRACTICAL						9	4.5
TOTAL						23	18.5

SEMESTER-II

THEORY							
Sl No.	Course Code	Subject Name	Contact period per week			Total	Credit
			L	T	P		
1	BS-M 201	Mathematics-II	3	1	0	4	4
2	BS-CH 201	Chemistry	3	1	0	4	4
3	ES-CS 201	Programming for problem solving	3	1	0	4	4
4	HS-MC 201	Values, Ethics and Indian Knowledge System	2	0	0	2	2
5	HM-HU 201	English Language and Technical Communication	2	0	0	2	2
TOTAL THEORY						16	16
PRACTICAL							
6	BS-CH 291	Chemistry Lab	0	0	3	3	1.5
7	ES-CS 291	Programming for problem solving Lab	0	0	3	3	1.5
8	ES-ME292	Engineering Drawing	0	0	3	3	1.5
9	HM-HU 291	English Language and Technical Communication Lab	0	0	2	2	1
TOTAL PRACTICAL						11	5.5
TOTAL						27	21.5

Haldia Institute of Technology

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Syllabus for B. Tech in Mechanical Engineering (Applicable from the academic session 2024-2025)

SEMESTER-III

THEORY							
Sl. No.	Course Code	Subject Name	Contact period per week			Total	Credit
			L	T	P		
1	BS-M 301	Mathematics-III	3	0	0	3	3
2	ES-ME 301	Engineering Mechanics	3	0	0	3	3
5	ES-ME 302	Engineering Thermodynamics	3	0	0	3	3
3	PC-ME 301	Fluid Mechanics & Hydraulic Machines	3	1	0	4	4
4	PC-ME 302	Material Science	3	0	0	3	3
6	PC-ME 303	Metrology & Measurement	3	0	0	3	3
7	MC 301	Essence of Constitution of INDIA & Laws in Engineering Practices	2	0	0	2	0
Total Theory						21	19
PRACTICAL							
1	PC-ME 391	Fluid Mechanics & Hydraulic Machines Lab	0	0	3	3	1.5
2	PC-ME 392	Metrology & Measurement Lab	0	0	3	3	1.5
3	PC-ME 393	Machine Drawing	0	0	3	3	1.5
Total Practical						09	4.5
Total of Semester						30	23.5

SEMESTER-IV

THEORY							
Sl. No.	Course Code	Subject Name	Contact period per week			Total	Credit
			L	T	P		
1	HM-ME 401	Engineering Economics	2	0	0	2	2
2	ES-ME 401	Numerical Methods & Programming	2	0	0	2	2
3	PC-ME 401	Strength of Materials	3	0	0	3	3
4	PC-ME 402	Manufacturing Processes	3	0	0	3	3
5	PC-ME 403	Analysis & Synthesis of Mechanisms	3	0	0	3	3
6	PC-ME 404	Applied Thermodynamics	3	0	0	3	3
7	MC 401	Industrial safety	2	0	0	2	0
Total Theory						18	16
PRACTICAL							
1	ES-ME 491	Numerical Methods & Programming Lab	0	0	2	2	1
2	PC-ME 491	Strength of Materials Lab	0	0	3	3	1.5
3	PC-ME 492	Manufacturing Processes Lab	0	0	3	3	1.5
Total Practical						8	4
Total of Semester						26	20

Haldia Institute of Technology

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Syllabus for B. Tech in Mechanical Engineering (Applicable from the academic session 2024-2025)

SEMESTER-V

THEORY							
Sl. No.	Course Code	Subject Name	Contact period per week			Total	Credit
			L	T	P		
1	HM-ME501	Principles and Practices of Management	3	0	0	3	3
2	PC-ME 501	Machining Principles & Machine Tools	3	0	0	3	3
3	PC-ME 502	IC Engines & Gas Turbines	3	1	0	4	4
4	PC-ME 503	Heat Transfer	3	0	0	3	3
5	PC-ME 504	Design of Machine Elements	3	0	0	3	3
6	PE-ME 501	Professional Elective-I (Course category – 2, Design)	3	0	0	3	3
Total Theory						19	19
PRACTICAL/SESSIONAL							
1	PC-ME 591	Machine Tools Lab	0	0	3	3	1.5
2	PC-ME 592	Thermal Engineering Lab	0	0	3	3	1.5
3	PC-ME 593	Heat Transfer Lab	0	0	3	3	1.5
Total Practical						9	4.5
Total of Semester						28	23.5

SEMESTER-VI

THEORY							
Sl. No.	Course Code	Subject Name	Contact period per week			Total	Credit
			L	T	P		
1	PC-ME 601	Air-conditioning & Refrigeration	3	0	0	3	3
2	PC-ME 602	Modern Manufacturing Processes	3	0	0	3	3
3	PC-ME 603	Design of Mechanical Systems	3	0	0	3	3
4	PC-ME 604	Dynamics of Machines	3	0	0	3	3
5	PE-ME 601	Professional Elective-II (Course category – 1, Manufacturing, Production & Industrial)	3	0	0	3	3
6	PE-ME 602	Professional Elective-III (Course category – 3, Thermal)	3	0	0	3	3
Total Theory						18	18
PRACTICAL							
1	PC-ME 691	Air-conditioning & Refrigeration Lab	0	0	3	3	1.5
2	PC-ME 692	Modern Manufacturing Process Lab	0	0	3	3	1.5
3	PC-ME 693	Design Practice Lab	0	0	3	3	1.5
4	PC-ME 694	Dynamics of Machines Lab	0	0	3	3	1.5
5	PW-ME 681	Project- I *	0	0	4	4	2
Total Practical						16	8
Total of Semester						34	26

* Project- I includes seminar on the project topic's introduction, literature survey, research gap finding, problem formulation and objectives.

NOTE: Vocational Training/Internship conducted up to sixth semester will be evaluated in seventh semester. Total accumulated hours of Vocational Training/Internship is 48 hours/week × 24 weeks = 1152 hours

Haldia Institute of Technology

(An Autonomous Institution Under Maulana Abul Kalam Azad University of Technology, West Bengal)

Syllabus for B. Tech in Mechanical Engineering (Applicable from the academic session 2024-2025)

SEMESTER-VII

THEORY							
Sl. No.	Course Code	Subject Name	Contact period per week			Total	Credit
			L	T	P		
1	PC-ME 701	Power Plant Engineering.	3	0	0	3	3
2	HM-ME 701	Production & Operations Management	3	0	0	3	3
3	PE-ME 701	Professional Elective-IV (Course category – 1, Manufacturing, Production & Industrial)	3	0	0	3	3
4	PE-ME 702	Professional Elective-V (Course category – 2, Design)	3	0	0	3	3
Total Theory						12	12
SESSIONAL							
1	PW-ME 781	Project – II **	0	0	6	6	3
2	PW-ME 782	Summer Internship / Vocational Training	0	0	0	0	2
Total Practical						6	5
Total of Semester						18	17

** Project – II include Design of product, experiment, strategy, algorithm, hypothesis, service aid, gadgets and thorough analysis.

SEMESTER-VIII

THEORY							
Sl. No.	Course Code	Subject Name	Contact period per week			Total	Credit
			L	T	P		
1	PE-ME 801	Professional Elective-VI(Course category – 3, Thermal)	3	0	0	3	3
2	OE-ME 801	Open Elective-I	2	0	0	2	2
3	OE-ME 802	Open Elective-II	3	0	0	3	3
Total Theory						8	8
SESSIONAL							
1	PW-ME 881	Project – III ***	0	0	10	10	5
2	PW-ME 882	Comprehensive Viva Voce	0	0	0	0	2
Total Practical						10	7
Total of Semester						18	15
Total Credit						165	

*** Project–III entails upshot of the project (keeping in view of utility, technical feasibility, economic viability, eco-friendliness) and also to divulge conclusion and future scope.

A multidisciplinary laboratory using AICTE IDEA lab, IoT lab, Computing lab etc. have to be conducted for a duration of 7.5 hours/week × 84 weeks (14 weeks/sem × 6 sem) = 630 hours.

Haldia Institute of Technology

(An Autonomous Institution Under Maulana Abul Kalam Azad University of Technology, West Bengal)

Syllabus for B. Tech in Mechanical Engineering (Applicable from the academic session 2024-2025)

The UG course a total credit of 165 has been well distributed among the broad categories of courses as per NBA guideline and NCrF as shown in the table hereunder.

Category	Semester								Total
	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	
HM/HSMC	-	5	-	2	3	-	3	-	13
BS	11.5	9.5	3	-	-	-	-	-	24
ES	7	7	6	3	-	-	-	-	23
PC	-	-	14.5	15	17.5	18	3	-	68
PE	-	-	-	-	3	6	6	3	18
OE	-	-	-	-	-	-	-	5	5
PW	-	-	-	-	-	2	5	7	14
MC	-	-	0	0	-	-	-	-	0
Credit	18.5	21.5	23.5	20	23.5	26	17	15	165

HM/HSMC: Humanities and Social Sciences including Management Courses

BS: Basic Science Courses

ES: Engineering Science Courses

PC: Professional core courses

PE: Professional Elective courses

OE: Open Elective courses

PW: Project work etc.

MC: Mandatory courses

Haldia Institute of Technology

(An Autonomous Institution Under Maulana Abul Kalam Azad University of Technology, West Bengal)

Syllabus for B. Tech in Mechanical Engineering (Applicable from the academic session 2024-2025)

List of Professional Electives

Maximum two (02) professional electives can be selected from each course category

Course Code	
Course Category – 1 (Manufacturing, Production & Industrial Engineering)	
A	Supply Chain Management
B	Total Quality Management
C	Material Handling Systems
D	Computer Integrated Manufacturing
E	Additive Manufacturing
F	Quantity Production Methods
G	Advanced Welding Technology
H	Surface Engineering & Laser Additive Manufacturing
I	Material Characterization
Course Category –2 (Design Engineering)	
J	Engineering Tribology
K	Finite Element Analysis
L	Mechanics of Composite Materials
M	Theory of Elasticity
N	Advanced Solid Mechanics
O	Non-Destructive Testing
P	Advanced Materials
Q	Mechanical Vibration
R	Fracture Mechanics
S	Bio-Mechanics
Course Category - 3 (Thermal Engineering)	
T	Computational Fluid Dynamics
U	Renewable Energy
V	Hydraulic and Pneumatic Control
W	Turbo-machinery
X	Two-phase Flow and Heat Transfer
Y	Automobile Engineering
Z	Advanced Fluid Mechanics

List of Open Electives (Interdisciplinary and Multidisciplinary)

Course Code	Course Name
A	Enterprise Resource Planning (ERP)
B	Marketing Management
C	Management Information System
D	System Engineering and Data Analytics
E	Operations Research
F	Mechatronics
H	Engineering Optimization
I	Industrial Robotics & Automation
J	Energy Storage

Haldia Institute of Technology

(An Autonomous Institution Under Maulana Abul Kalam Azad University of Technology, West Bengal)

Syllabus for B. Tech in Mechanical Engineering

(Applicable from the academic session 2024-2025)

K	AI & Data Science
L	Project Planning and Cost Estimation
M	Microprocessor & Microcontroller
N	Fuel Cell Technology
O	Project Management
P	Electrical Vehicle Technology

The credits of the different courses are ascertained through the guidelines laid down by NBA and NCrF are shown hereunder.

Course Code	Course Titles	Teaching & Learning Scheme					
		Classroom Instructions (CI) (In hours per semester)		Lab Instructions (LI) (In hours per semester)	Term Work (TW) and Self Learning (SL) (TW+SL) (In hours per semester)	Total no. of Hours per semester	Total Credits (C) (Total Hours/30)
		L	T	P	SL		
BS-M 101	Mathematics-I	42	14	0	64	120	4
BS-PH 101	Physics	42	14	0	64	120	4
ES-EE 101	Basic Elec. & Electro. Engg.	42	14	0	64	120	4
BS-BT 101	Biology for Engineers	28	0	0	32	60	2
BS-PH 191	Physics Lab	0	0	42	3	45	1.5
ES-EE 191	Basic Elec. & Electro. Engg. Lab	0	0	42	3	45	1.5
ES-ME 191	Workshop Practice	0	0	42	3	45	1.5
AU 101	NSS	0	0	50	0	50	0
BS-M 201	Mathematics-II	42	14	0	64	120	4
BS-CH 201	Chemistry	42	14	0	64	120	4
ES-CS 201	Programming for problem solving	42	14	0	64	120	4
HS-MC 201	Values, Ethics and Indian Knowledge System	28	0	0	32	60	2
HM-HU 201	English Language and Technical Communication	28	0	0	32	60	2
BS-CH 291	Chemistry Lab	0	0	42	3	45	1.5
ES-CS 291	Programming for problem solving Lab	0	0	42	3	45	1.5
ES-ME292	Engineering Drawing	0	0	42	3	45	1.5

Haldia Institute of Technology

(An Autonomous Institution Under Maulana Abul Kalam Azad University of Technology, West Bengal)

Syllabus for B. Tech in Mechanical Engineering

(Applicable from the academic session 2024-2025)

HM-HU 291	English Language and Technical Communication Lab	0	0	28	2	30	1
BS-M 301	Mathematics-III	42	0	0	48	90	3
ES-ME 301	Engineering Mechanics	42	0	0	48	90	3
ES-ME 302	Engineering Thermodynamics	42	0	0	48	90	3
PC-ME 301	Fluid Mechanics & Hydraulic Machines	42	14	0	64	120	4
PC-ME 302	Material Science	42	0	0	48	90	3
PC-ME 303	Metrology & Measurement	42	0	0	48	90	3
MC 301	Essence of Constitution of INDIA & Laws in Engineering Practices	28	0	0	22	50	0
PC-ME 391	Fluid Mechanics & Hydraulic Machines Lab	0	0	42	3	45	1.5
PC-ME 392	Metrology & Measurement Lab	0	0	42	3	45	1.5
PC-ME 393	Machine Drawing	0	0	42	3	45	1.5
HM-ME 401	Engineering Economics	28	0	0	32	60	2
ES-ME 401	Numerical Methods & Programming	28	0	0	32	60	2
PC-ME 401	Strength of Materials	42	0	0	48	90	3
PC-ME 402	Manufacturing Processes	42	0	0	48	90	3
PC-ME 403	Analysis & synthesis of Mechanisms	42	0	0	48	90	3
PC-ME 404	Applied Thermodynamics	42	0	0	48	90	3
MC 401	Industrial safety	28	0	0	22	50	0
ES-ME 491	Numerical Methods & Programming Lab	0	0	28	2	30	1
PC-ME 492	Strength of Materials Lab	0	0	42	3	45	1.5
PC-ME 493	Manufacturing Processes Lab	0	0	42	3	45	1.5
HM-ME 501	Principles and Practices of Management	42	0	0	48	90	3
PC-ME 501	Machining Principles & Machine Tools	42	0	0	48	90	3
PC-ME 502	IC Engines	42	14	0	64	120	4
PC-ME 503	Heat Transfer	42	0	0	48	90	3

Haldia Institute of Technology

(An Autonomous Institution Under Maulana Abul Kalam Azad University of Technology, West Bengal)

Syllabus for B. Tech in Mechanical Engineering

(Applicable from the academic session 2024-2025)

PC-ME 504	Design of Machine Elements	42	0	0	48	90	3
PE-ME 501	Professional Elective-I (Course category – 2, Design)	42	0	0	48	90	3
PC-ME 591	Machine Tools Lab	0	0	42	3	45	1.5
PC-ME 592	Thermal Engineering Lab	0	0	42	3	45	1.5
PC-ME 593	Heat Transfer Lab	0	0	42	3	45	1.5
PC-ME 601	Air-conditioning & Refrigeration	42	0	0	48	90	3
PC-ME 602	Modern Manufacturing Processes	42	0	0	48	90	3
PC-ME 603	Design of Mechanical Systems	42	0	0	48	90	3
PC-ME 604	Dynamics of Machines	42	0	0	48	90	3
PE-ME 601	Professional Elective-II (Course category – 1, Manufacturing, Production & Industrial)	42	0	0	48	90	3
PE-ME 602	Professional Elective-III (Course category – 3, Thermal)	42	0	0	48	90	3
PC-ME 691	Air-conditioning & Refrigeration Lab	0	0	42	3	45	1.5
PC-ME 692	Modern Manufacturing Process Lab	0	0	42	3	45	1.5
PC-ME 693	Design Practice Lab	0	0	42	3	45	1.5
PC-ME 694	Dynamics of Machines Lab	0	0	42	3	45	1.5
PW-ME 681	Project- I *	0	0	35	25	60	2
PC-ME 701	Power Plant Engineering.	42	0	0	48	90	3
HM-ME 701	Production & Operations Management	42	0	0	48	90	3
PE-ME 701	Professional Elective-IV (Course category – 1, Manufacturing, Production & Industrial)	42	0	0	48	90	3
PE-ME 702	Professional Elective-V (Course category – 2, Design)	42	0	0	48	90	3

Haldia Institute of Technology

(An Autonomous Institution Under Maulana Abul Kalam Azad University of Technology, West Bengal)

Syllabus for B. Tech in Mechanical Engineering (Applicable from the academic session 2024-2025)

PW-ME 781	Project – II **	0	0	50	40	90	3
PW-ME 782	Summer Internship / Vocational Training	0	0	0	60	60	2
PE-ME 801	Professional Elective- VI(Course category – 3, Thermal)	42	0	0	48	90	3
OE-ME 801	Open Elective-I	28	0	0	32	60	2
OE-ME 802	Open Elective-II	42	0	0	48	90	3
PW-ME 881	Project – III ***	0	0	80	70	150	5
PW-ME 882	Comprehensive Viva Voce	0	0	0	60	60	2

The following value-added courses (VAC) are offered by the department as furnished hereunder.

Name of the value-added courses (with 30 or more contact hours) offered	Course Code, if any	Duration of course (in hours)
AutoCAD for Mechanical Engineers (Industry partner: CADD Center)	VAC ME 191	40 Hrs
3D Printing with FDM (Industry partner: Ardent Computech. Pvt. Ltd.)	VAC ME 192	40 Hrs
Solid Works (Industry partner: Ardent Computech. Pvt. Ltd.)	VAC ME193	40 Hrs

Haldia Institute of Technology

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Syllabus for B. Tech in Mechanical Engineering

(Applicable from the academic session 2024-2025)

The details of Total Notional Learning Hours excluding self-study Hours as furnished hereunder.

Semester	Credit point	Notional Learning Hours
1 st	18.5	$23 \times 14 = 322$
2 nd	21.5	$27 \times 14 = 378$
3 rd	23.5	$30 \times 14 = 420$
4 th	20	$26 \times 14 = 364$
5 th	23.5	$28 \times 14 = 392$
6 th	26	$34 \times 14 = 476$
7 th	17	$18 \times 14 = 252$
8 th	15	$18 \times 14 = 252$
NSS	0	$10 \times 14 = 140$
Summer Internship / Vocational Training	2	$48 \times 24 = 1152$
Multidisciplinary laboratory	0	$7.5 \times 84 = 630$
Value added course (VAC)	0	$40 \times 3 = 120$
Total	165	4898 (1224.5 hrs/yr)