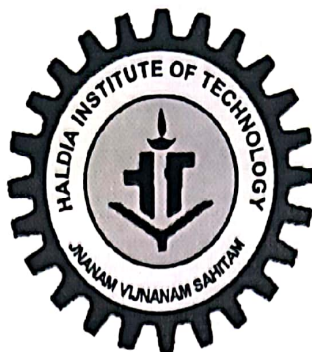


Haldia Institute of Technology

[An Autonomous Institute under MAKAUT]



Report on Academic Audit (2023-2024) Department of Mechanical Engineering

Schedule of the Academic Audit on 3rd September 2024

- | | |
|---------------|--|
| 1. Auditor 1: | Dr. S. Mitra
Professor
Department of Production Engineering JU, Kolkata. |
| 2. Auditor 2: | Dr. S. Bhaumik
Professor
Dept. of Aerospace Engineering & Applied Mechanics, (IEST) Shibpur, Howrah. |

S.No	Time	Auditor-I Departments	Auditor-II Departments
1	10.30 AM to 01.30 PM	File Check 1-13	File Check 14-26
2	01.00 PM to 02.00 PM	Lunch	
3	02.00 PM to 03.00 PM	CO, PO & PSO Attainment	Students Project Analysis
4	03.00 PM to 04.00 PM	- Workshop & Lab Visit - Placement and Internship	
5	04.00 PM to 4.30 PM	Report writing and Closing Meeting	

List of Files Audited:

S.No	F. No	Description
I - Curricular Aspects		
1	AE/F1.1	Department Vision, Mission, PEO, PSOs
2	AE/F1.2	Department PEO, Academic calendar & adherence
3	AE/F1.3	Department SWOT analysis
4	AE/F1.4	Field Project Internship and In plant training and industrial visits
5	AE/F1.5	Board of Studies Minutes, Regulations, Curriculum and Syllabus for all Regulations
6	AE/F1.6	Feedback on curriculum enrichment (Feedback from all stake holders)
7	AE/F1.7	Curriculum enrichment for (Employability & Skill Development)
8	AE/F1.8	Value Added Courses (Please verify students certificate in value added course)
II - Teaching learning & support system Aspects		
9	AE/F2.1	Students strength and Faculty Students Ratio (as per NBA format)
10	AE/F2.2	Record of Teaching and Non-Teaching staff profile
11	AE/F2.3	Students mentoring file and action taken (Please verify the document and comment)
12	AE/F2.4	CO-PO mapping and CO attainment (Please verify the attainment for all years with proof)
13	AE/F2.5	Student Satisfaction Survey on overall institutional performance (Please verify the feedback), survey on infrastructure and facilities.

14	AE/2.6	Students achievement in examination (result analysis) (Please verify students secured more than 8.25 CGPA & more than 6.75, single attempt pass without backlog for 2 nd and 3 rd year)
15	AE/F2.7	Continuous Assessment Analysis (Both Theory and Practical courses), Evaluation, Question, CO compliance etc. Result publication.
16	AE/F2.8	End Semester Exam Result Analysis
17	AE/F2.9	Feedback on Teaching Learning process & Syllabus
18	AE/F2.10	Course file (Theory and laboratory courses) (Please verify Internal Test Note (Theory), Class note, Assignment)
19	AE/F2.11	All Lab Maintenance, Stock Register, Stock Verification Record and Calibration details
20	AE/F2.12	Lab Manual, Records, Observation and Time Table (Please verify 2 Nos. /subject/class for all the practical courses)
21	AE/F2.13	Students' attendance (Please verify the Master attendance)
22	AE/F2.14	No. of Research Supervisors and Scholar details and Ph.D awarded (Please verify the proof)
23	AE/F2.15	Research paper publications (International / National Journal and Conference (Please verify No. of Publication and Quality of publication)
24	AE/F2.16	Books, chapters and Conference Proceedings published by faculty (Please verify the documents)
25	AE/F2.17	Conference, Seminar etc organized by the Department (Please verify number of programmes organized with proof)
26	AE/F2.18	Details of IPR filing (Please verify status filed, published and awarded)

Key Findings & Suggestions:

Department Vision, Mission, PEO, PSOs: The experts suggested that the Departmental Vision, Mission, PEOs, and PSOs be changed because of their formative components. Accordingly, the department should revise these statements to ensure they are clear, measurable, and aligned with institutional goals and program outcomes, and shall have to submit the revised versions for approval.

Shortcomings in CO Attainment: The review found that Course Outcomes (COs) are inconsistently articulated, often lacking clear Action, Degree, Condition, and Criteria components, making assessment and attainment difficult to establish objectively. Alignment between COs, instructional activities, assessment methods, and cognitive levels also needs strengthening, particularly through proper application of Modified Bloom's Taxonomy (CL × KC). As a corrective measure, the department shall systematically rewrite COs using the Action–Degree–Condition–Criteria framework, ensure appropriate CL × KC alignment, and map revised COs to relevant teaching-learning activities and assessment instruments for valid attainment measurement.

Shortcomings in PO/PSO Attainment: The review found that CO–PO/PSO matrices are often over-correlated, with superfluous mappings that inflate attainment values without reflecting genuine outcome achievement. This is especially problematic for attributes like Engineer and Society, Ethics, Communication, Individual and Team Work, and Project Management and Finance, which are frequently mapped weakly or without adequate justification. The department must revise these matrices based on actual CO contribution, removing unjustified mappings and ensuring evidence-based articulation levels.

The table shows attainment of PO PSOs with gap analysis. None of the 15 outcomes reached the set value of 3. The knowledge-based outcomes (PO1–PO4, mean 2.20) are stronger than PO5–PO12 (mean 1.93). The largest gaps are in PO11, PO12, PO9, PSO3 and PO10, so effort should go there first.

PO / PSO	Outcome	Attained	Set value	Gap	% of set value	Status	Priority
PO1	Engineering Knowledge	2.28	3	0.72	76.0%	Not met	Sustain
PO2	Problem Analysis	2.24	3	0.76	74.7%	Not met	Sustain
PO3	Design/Development of Solutions	2.07	3	0.93	69.0%	Not met	Sustain
PO4	Conduct Investigations of Complex Problems	2.22	3	0.78	74.0%	Not met	Sustain
PO5	Modern Tool Usage	2.05	3	0.95	68.3%	Not met	Sustain
PO6	The Engineer and Society	2.02	3	0.98	67.3%	Not met	Sustain
PO7	Environment and Sustainability	2.02	3	0.98	67.3%	Not met	Sustain
PO8	Ethics	2.01	3	0.99	67.0%	Not met	Sustain
PO9	Individual and Team Work	1.89	3	1.11	63.0%	Not met	Medium
PO10	Communication	1.95	3	1.05	65.0%	Not met	Medium
PO11	Project Management and Finance	1.74	3	1.26	58.0%	Not met	High
PO12	Life-Long Learning	1.77	3	1.23	59.0%	Not met	High
PSO1	Design, analysis and evaluation of mechanical components and systems	1.98	3	1.02	66.0%	Not met	Medium
PSO2	Use of modern engineering tools and software	2.00	3	1.00	66.7%	Not met	Sustain
PSO3	Professional and ethical responsibility, communication and teamwork	1.93	3	1.07	64.3%	Not met	Medium

Suggestive note for improvement

- **PO11 (1.74):** Add project planning, scheduling and cost estimation to project courses and Engineering Economics, with industry case studies and expert sessions on management and finance.
- **PO12 (1.77):** Encourage self-learning through assignments, certification courses and seminar topics on emerging technologies.
- **PO9 and PSO3 (1.89, 1.93):** Use team-based projects with defined roles and assess both individual and team contribution with rubrics. Include ethics and sustainability in project evaluation.

- **PO10 (1.95):** Add technical-writing and presentation practice with rubrics across laboratories, seminar and project courses.
- **PO5-PO8, PSO1 and PSO2 (about 2.0):** Strengthen hands-on use of modern design and simulation tools. Include societal, environmental and ethics content in case studies and projects.
- **Process:** Check that the CO-PO/PSO mapping gives PO9-PO12 enough courses and assessments. Review whether a set value of 3, the maximum level, is realistic. Track the same outcomes in the next two years.

Curriculum and Syllabus: Areas of Concern

The syllabus is not yet aligned with NCrF and NEP 2020. Credit mapping to NCrF levels, multiple entry/exit options, Minor/Honours pathways and credit-bearing internships are not yet in place. Coverage of robotics, AI and advanced manufacturing can be increased, and the syllabus should be restructured to an NEP/NCrF-aligned credit framework with updated CO-PO mapping.

Teaching and Learning Process: Areas of Concern

The following practices are not yet in place:

- A structured remedial and enrichment programme for slow and advanced learners.
- Wider use of active-learning methods such as flipped classroom and problem-based learning.
- Mandatory industry internships and industry-sponsored projects.
- Uniform assessment rubrics for laboratory, project and seminar courses.

Faculty and Research: Areas of Concern

Research output and industry collaboration are uneven across the faculty. Participation in faculty development programmes and industry attachments can be increased.

Student Performance and Outcomes: Areas of Concern

PO/PSO attainment is below the set value of 3, with the lowest values in project management, life-long learning and teamwork. Career counseling, soft-skill development and individual mentoring can be made more structured.

Infrastructure and Facilities: Areas of Concern

Some laboratory equipment needs updating. More simulation tools and research space would strengthen training in emerging technologies.

Research, Consultancy and Extension Activities: Areas of Concern

Consultancy and sponsored projects are limited and could grow through stronger industry ties. Extension activities can be planned with measurable outcomes and wider student participation.

Feedback Mechanism: Areas of Concern

Actions taken on feedback are not consistently communicated back to stakeholders. Alumni engagement is not yet a structured programme for mentoring, career guidance and internships.

Recommendations:

CO, PO & PSO attainment: The Visiting Team recommends that the department undertake a comprehensive review and revision of all Course Outcomes (COs) in accordance with the Action-Degree-Condition-Criteria guidelines. COs should be specific, measurable, assessable, and aligned with the Modified Bloom's Taxonomy (CL × KC). The revised COs should be appropriately linked with teaching-learning processes and assessment methods to ensure that the reported CO attainment genuinely reflects student learning.

The Visiting Team further recommends that the department rationalize the CO-PO/PSO articulation matrices by eliminating unnecessary or superfluous mappings and establishing mappings only where a demonstrable contribution exists. Particular attention should be given to **Engineer and Society, Ethics, Communication, Individual and Team Work, and Project Management and Finance**. PO/PSO attainment should be evidence-based and supported by appropriate assessment data so that the reported attainment represents the **actual achievement of program outcomes rather than inflated values resulting from excessive mapping**.

Prof. Dr. G. K. Bose

Professor & Head

Department of Mechanical Engineering HIT, Haldia.

Head
Dept. of Mechanical Engineering
Haldia Institute of Technology

Copy To:

- The Principal HIT
- The Registrar General HIT
- The Dean SOE
- Prof. Dr. S. Bhaumik, Professor, Dept. of Aerospace Engineering & Applied Mechanics, (IEST) Shibpur, Howrah.
- Prof. Dr. S. Mitra, Professor, Department of Production Engineering, JU, Kolkata.
- All faculty members [by name].....
- Office file

