DEPARTMENT OF MECHANICAL ENGINEERING

VIRTUAL LAB–BASED LEARNING METHOD

Academic year	: 2024-2025
Degree	: B.E. Mechanical Engineering
Year & Semester	: II/III
Course Code & Title	: CE3391/ Fluid Mechanics and Machinery
Name of the Faculty Member	: Dr.P.Purushothaman
Date	: 09/09/2024
Innovative Practice	: Virtual Lab–Based Learning Method
Topic	: Pumps, Turbines, and Compressors
Total Students Participated	: 27

OBJECTIVE OF VIRTUAL LAB–BASED LEARNING

Virtual Lab–Based Learning (SBL) in **Fluid Mechanics and Machinery** offers an immersive approach where students actively engage in understanding fluid behavior, machine performance, and system efficiency. Students explore fluid flow concepts through lab experiments and simulations by questioning, analyzing, interpreting results, and presenting their findings. They practice solving engineering problems, make design decisions, propose solutions, and explain fluid mechanics concepts in their own words through lab reports, discussions, and presentations.

VIRTUAL LAB–BASED LEARNING

Virtual Lab–Based Learning in fluid mechanics and machinery enables students to understand complex flow behaviour's and system performance through virtual modelling and analysis. It provides a systematic framework to enhance problem-solving skills by:

- **Problem Identification** – recognizing and defining fluid mechanics or machinery-related challenges (e.g., cavitation, pressure drop, pump efficiency).
- **Generating Ideas** – developing multiple solution approaches using theoretical analysis, laboratory experiments, and especially computational simulations (CFD tools).
- **Selecting the Best Approach** – evaluating and choosing the most effective simulation method or experimental validation technique.

- **Conceptual Design** – applying fluid mechanics principles in combination with simulation software to design, optimize, or improve systems such as pumps, turbines, and pipe networks.
- **Final Solution** – analyzing and interpreting simulation results, validating with experimental data where possible, and presenting practical, evidence-based solutions.

METHODOLOGY FOLLOWED

- Students perform experiments using virtual lab simulations by adjusting parameters such as flow rate, pressure, head, speed, and efficiency. The simulations replicate real laboratory conditions, allowing repeated trials without equipment constraints.
- Students record simulated readings, plot graphs (e.g., discharge vs. head, efficiency vs. load), and analyze system behavior. Errors and deviations are discussed to strengthen analytical and problem-solving skills.
- Students work individually or in small groups to discuss observations and results. Faculty facilitates interactive discussions to connect theoretical principles with simulated outcomes

OUTCOMES

1. VLBL improved attentiveness and hands-on involvement in **Fluid Mechanics and Machinery laboratory sessions**.
2. Students gained deeper understanding of **fluid properties, flow behavior, and machinery performance** through experiments and simulations.
3. The approach enhanced **problem analysis, result interpretation, and application of theory to real-world fluid flow systems**.
4. SBL promoted **critical thinking, problem-solving, teamwork, and communication skills** while encouraging the use of both laboratory experimentation and modern simulation tools for lifelong learning.

RELEVANCES TO Pos

PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12

Name List of students Attended – II- Year Mechanical

S.NO	REGISTER NO	STUDENTS NAME
1	312823114001	Akash M P
2	312823114002	Akash Ponniah S
3	312823114004	Gowtham M
4	312823114005	Gurumoorthy A
5	312823114006	Hariharan K
6	312823114007	Hariharan M
7	312823114008	Jagadish C
8	312823114009	Jai Kiran G V
9	312823114010	Kalith N
10	312823114011	Lokesh D
11	312823114013	Mohamed Ali Jinna N
12	312823114014	Mukesh JMB
13	312823114015	Narendhiran D
14	312823114016	Pavin M
15	312823114017	Pooja Sree L
16	312823114018	Ragul Gandhi P
17	312823114021	Santhakumar Y
18	312823114023	Sarugesh M
19	312823114024	Sivagiri P
20	312823114025	Sujit Kumar Agasti M
21	312823114026	Tharunraj R
22	312823114027	Umapathy S
23	312823114028	Vignesh P
24	312823114301	Ajay R
25	312823114302	Anantharaman N
26	312823114303	Hariharan R
27	312823114304	Prithivi Raj V

Virtual Lab–Based Learning Method conducted on 09.09.2024 by Dr.P.Purushothaman for Fluid Mechanics and Machinery course

The valuable feedbacks can be provided in the below link for the above innovative teaching method.

https://docs.google.com/forms/d/1JEmxUOe79fQeULUwEcyHnVlIJeZj7zku9X5hmFzd_Bw

Faculty In charge

HoD/Mech