VEL TECH HIGH TECH

Dr. RANGARAJAN Dr. SAKUNTHALA ENGINEERING COLLEGE

An Autonomous Institution

Approved by AICTE-New Delhi, Affiliated to Anna University, Chennai

Accredited by NBA, New Delhi & Accredited by NAAC with "A" Grade & CGPA of 3.27

DEPARTMENT OF CHEMICAL ENGINEERING

INNOVATIVE ASSIGNMENT-2

DEGREE	**B.Tech**	**FACULTY NAME: Ms. M. Janani**	
COURSE CODE:	**21CH33T**	**COURSE NAME:**	**Fluid Mechanics for Chemical Engineers**
YEAR/SEM	**II/III**	**STUDENTS STRENGTH / BATCHES**	**41 / 13**

UNIT III KINEMATICS & DYNAMICS OF FLUID FLOW **9**

Mass balance, Continuity equation, Equation of motion, Bernoulli equation, Navier- Stokes equation, Pitot tube, Venturimeter, Orifice meter, Rotameter, Ultrasonic flow meter, Valves, Pumps and compressors.

UNIT IV DIMENSIONAL ANALYSIS AND MODEL ANALYSIS **9**

Dimensional homogeneity, Dimensional analysis, Rayleigh method, Buckingham pi theorem, Forces acting in fluid flow and Dimensionless numbers, Similitude, Types of similarity, Model Laws.

VH NO	STUDENT NAME	PROBLEM STATEMENT	CO	K LEVEL
BATCH 1				
VH 12136 VH 12151 VH 12155	Aswathi B Padmadharshni R Ranjani C	**Continuity Equation** (i) Describe a real-world scenario where the continuity equation is essential for understanding and solving a fluid mechanics problem. (ii) Explain how the continuity equation is implemented in numerical simulations using CFD. Discuss the challenges and advantages of using computational methods to solve fluid flow problems. (iii) Infer how the continuity equation is utilized in understanding and optimizing fluid mixing processes. Provide examples from industries such as chemical engineering or food processing where proper mixing is crucial. **Keynote: Introduction, real-world scenario, challenges and advantages. CFD, Examples from industries, conclusion.**	CO3	K2
BATCH 2				
VH 12169 VH 12142	Dhanya Shree R Harini Preetha R	**Bernoulli Equation** (i) Investigate the application of the Bernoulli equation in aerodynamics. Discuss how it is utilized to explain lift generation in airplanes. Include the concept of airfoil design and how changes in velocity and pressure contribute to lift. (ii) Explain how the Bernoulli equation is applied	CO3	K2

VH 12162	Sindhu M S	in understanding blood flow in the human circulatory system. Discuss the factors that affect blood velocity and pressure, and how the Bernoulli equation can be used to analyze these dynamics. (iii) Investigate the phenomenon of cavitation in fluid systems and its relationship with the Bernoulli equation. Discuss how pressure variations in the fluid can lead to cavitation and the potential engineering challenges associated with it. **Keynote: Introduction, Bernoulli equation, aerodynamics, lift generation in airplanes, factors, blood velocity and pressure, cavitation, conclusion, References**.		
BATCH 3				
VH 12139 VH 12152 VH 12143	Dhiviya S Preethi K Janani R	**Venturimeter** (i) Compare venturimeters with other flow measurement devices such as orifice meters and flow nozzles. Highlight the advantages and limitations of each method, and provide recommendations for specific applications. (ii) Illustrate how changes in temperature and pressure affect the accuracy of a venturi meter. Discuss the potential sources of error and propose modifications to mitigate these effects. (iii)Explore specific industries or applications where venturimeters are commonly used. Discuss the reasons for their preference over other flow measurement devices in these scenarios and provide examples. **Keynote: Introduction, venturimeters, advantages, limitations, Temperature and pressure affect, applications, examples, conclusion, References.**	CO3	K2
BATCH 4				
VH 12149 VH 12150 VH 12166 VH12172	Nirmithavalli R Nissy Sunil Vaishnavai. S Rebeca T	**Orificemeter** (i) Investigate and discuss two real-world applications where orificemeters are used for fluid flow measurement. (ii) Explain how the orificemeter design is adapted to suit each application. (iii) Compare and contrast the performance of orifice plates made from different materials (e.g., metal, plastic, composite) in terms of accuracy, durability, and resistance to corrosion. (iv) Discuss the considerations for selecting a specific material for a given application. **Keynote: Introduction, real-world applications, orificemeter, performance of orifice plates, considerations, specific material, conclusion, References.**	CO3	K2
BATCH 5				
VH 12146 VH 12157 VH 12168	Lokeshwaran K Sabari S B Yazh Mukilan S	**Orificemeter** (i) Explain recent innovations in orificemeter design and technology. Explore advancements that aim to improve accuracy, reduce pressure loss, or enhance the adaptability of orificemeters to different fluid types and flow conditions (ii) Infer the role of orificemeters in renewable energy systems, such as hydropower or geothermal energy.	CO3	K2

		(iii) Discuss how orificemeters are used to measure and optimize fluid flow in these applications, contributing to the efficiency of renewable energy generation. **Keynote: Introduction, recent innovations, advancements, renewable energy systems, efficiency, conclusion, References.**		
BATCH 6				
VH 12171 VH 12138 VH 12148	Deventhiran R Devi Prasad V Mohammed Arsath Gani. S	**Flow Measurement Devices** (i) Explain the use of flow measurement devices in biomedical applications, such as drug delivery systems or blood flow monitoring. (ii) Discuss the specific requirements for flow measurement in these applications and propose suitable devices with justifications. (iii) Explain the role of flow measurement devices in water management for environmental conservation. Discuss how accurate flow measurement contributes to efficient water usage, pollution control, and sustainable water resource management. **Keynote: Introduction, flow measurement devices, biomedical applications, specific requirements, water management, conclusion, References.**	CO3	K2
BATCH 7				
VH 12137 VH 12156 VH 12170	Bhalaji. P Rushikesh V Shribharath K B	**Pumps and Compressors** (i) Compare and contrast the efficiency of different types of pumps (centrifugal, reciprocating.) in various operating conditions. (ii) Explain factors such as flow rate, head, and energy consumption, and discuss the advantages and disadvantages of each type of pump. (iii) Explain safety measures and protocols associated with pump and compressor operation. Discuss potential hazards, risk mitigation strategies, and the importance of training for operators to ensure a safe working environment. **Keynote: Introduction, efficiency, types, operating conditions, factors,safety measures, advantages and disadvantages, conclusion, References.**	CO3	K2
BATCH 8				
VH 12135 VH 12158 VH 12165	Aravinth Selan M Saran J Thilak E	**Fuid Dynamics** (i) Explain the emerging field of fluidic soft robotics. Investigate how fluid-filled soft structures can be used in robotics for versatile and adaptable movements. (ii) Infer applications and discuss the advantages of fluidic soft robotics over traditional rigid robots. (iii) Explain the fluid dynamics involved in different renewable energy technologies, such as wind turbines, tidal energy, or wave energy converters. Discuss the challenges and innovations in harnessing fluid flow for sustainable energy production. **Content: Introduction, fluidic soft robotics,**	CO4	K2

		applications, fluid dynamics, renewable energy technologies, conclusion, References.		
BATCH 9				
VH 12145 VH 12161 VH 12164	Karthick T Shyam Sundher I G Thamizh Valavan S	**Rayleigh method** (i)Explain real-world scenario and challenge in the Rayleigh method to assess the structural integrity and vibration characteristics. Discuss practical considerations and potential design modifications. (ii) Compare the results obtained from the Rayleigh method with those from other methods (e.g., finite element analysis, experimental data). (iii) Discuss the advantages and limitations of the Rayleigh method in different scenarios. **Content: Introduction, Rayleigh method, real-world scenario, Comparision, advantages and limitations, conclusion, References.**	CO4	K2
BATCH 10				
VH12140 VH 12144 VH 12160	Dinesh R Kamalesh M Shri Ram J	**Buckingham Pi theorem** (i) Explain the application of Buckingham Pi theorem in understanding the rheological behavior of polymeric fluids. Discuss their implications in industrial processes, such as polymer processing. (ii) Illustrate how the Buckingham Pi theorem can be applied to study the behavior of supercritical fluids. Discuss the relevant dimensionless parameters and their importance in applications such as supercritical fluid extraction and processing (iii) Infer the behavior of particles in a fluidized bed. Use Buckingham Pi theorem to explain the key parameters influencing particle movement and bed stability. Discuss the significance of these dimensionless groups in optimizing fluidized bed reactors. **Content: Introduction, Buckingham Pi theorem, application, polymeric fluids, dimensionless parameters, behavior of particle, key parameters, conclusion, References.**	CO4	K2
BATCH 11				
VH 12147 VH 12154 VH 12167	Mithun Chakaravathy V Purushothaman K Vignesh S	**Similarity** (i) Explain the concept of geometric similarity in fluid mechanics. Provide examples of situations where geometric similarity is crucial for accurate modeling. (ii) Explain Reynolds similarity and explain its significance in fluid mechanics. (iii)Explore how the principles of fluid mechanics, including similarity concepts, are utilized in the design of medical devices such as artificial heart valves or drug delivery systems. **Content: Introduction, similarity, geometric similarity, accurate modeling, Reynolds similarity, medical devices, conclusion, References.**	CO2	K2
BATCH 12				

VH 12141 VH 12153 VH 12159 VH 12163	Hariharasudhan V S Pugalendran R Sheik Mohammed Abdul Sameei R Sri Babuji M	**Dimensionless Number** (i)Provide a comprehensive overview of dimensionless numbers commonly used in fluid mechanics . (ii) Explain Reynolds number, Froude number, and Mach number. Ilustrate the physical significance of each dimensionless number. (iii) Infer emerging trends in fluid mechanics research and potential new dimensionless numbers that researchers are considering.	CO4	K2
BATCH 13				
VH12711 VH12713 VH12714	Venkata Borra Bargav Mugilan T Rakesh	**Flow Analysis Techniques** (i) Explain real-world case studies where flow analysis techniques have been applied. (ii) Illustrtae the challenges faced, the methods employed in flow analysis techniques. (iii) Illustrate the outcomes achieved in different flow analysis scenarios. **Content: Introduction, low Analysis Techniques, real-world case studies, outcomes, references.**	CO4	K2

HOD/Chemical **SCHOOL DEAN** **DEAN ACADEMICS**