U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

May 2023 Semester End Main Examinations

Programme: B.E. **Semester: III**
Branch: Biotechnology **Duration: 3 hrs.**
Course Code: 22BT3PCFME **Max Marks: 100**
Course: Fluid Mechanics **Date: 17.05.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1	a)	Explain the significance of dimensionless groups and constants used in fluid flow phenomena.	**06**
	b)	Classify the types of fluids, based on Newtons law. Show the classification with the neat rheology graph. Give examples.	**10**
	c)	Describe Reynold's experiment with a neat sketch.	**04**

UNIT - II

2	a)	Derive Bernoulli's equation using Newton's Second law of motion. State its applications.	**12**
	b)	Water is flowing through a pipe having diameter 300 mm and 200 mm at the bottom and top end respectively. The intensity of pressure at the bottom end is 24.525 N/cm^2 and the pressure at the upper end is 9.81 N/cm^2. Determine the difference in the datum head if the flow rate through the pipe is 40 L/sec.	**08**

OR

3	a)	Derive Hagen Poiseuille equation with suitable assumptions. List its applications.	**12**
	b)	A small capillary with an inside diameter of 2.23 x 10^{-3} m and length 0.317 m is being used continuously to measure the flow rate of the liquid having a density of 875 kg/m^3 and viscosity of 1.13 x 10^{-3} Pa.s. The pressure drop reading across the capillary during flow is 0.0655 m of water (density 996 kg/m^3). Determine the volumetric flowrate if end corrections are neglected.	**08**

UNIT - III

4	a)	Describe the construction and working of an orifice meter with neat diagram.	**10**
	b)	Draw and analyze the characteristic curves of a centrifugal pump. State its applications.	**10**

UNIT - IV

5	a)	Derive the flow equation for a venturimeter with suitable assumptions.	**10**

b) The flow of water through a 50 mm pipe is measured by means of an orifice meter having an aperture of 40 mm. The pressure drop recorded across the meter is 150 mm on a mercury manometer. If the coefficient of discharge of the orifice meter is 0.60, what is the Reynolds number in the pipe and what will be the pressure drop over 30 m length of the pipe? **10**
Data: Density of mercury=13600 kg/m^3, Density of water=1000 kg/m^3, viscosity of water=1 (mN.s)/m^2

OR

6 a) Distinguish between the various stages of sedimentation with the neat diagram. **10**

b) Differentiate between constant pressure filtration and constant rate filtration. Describe the working of a leaf filter with a neat sketch. **10**

UNIT – V

7 a) Explain the different types of agitators used in bioprocess industries and list their applications. **10**

b) Describe the working of a Ribbon blender with the neat sketch. **10**

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