Enrollment No.....................................

Faculty of Engineering

End Sem (Odd) Examination Dec-2022

CE3CO19 Fluid Mechanics

Programme: B.Tech.   Branch/Specialisation: CE

Duration: 3 Hrs.   **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1   i.   Which of the following is the basic principle of pipe flow?   **1**
           (a) Momentum principle   (b) Energy equation
           (c) Continuity equation   (d) All of these

      ii. The CGS unit of kinematic viscosity is-   **1**
           (a) m/sec2   (b) cm3/sec   (c) cm2/sec   (d) m-sec

      iii. In the case of floating body for stable equilibrium-   **1**
           (a) M is above G   (b) G is above M
           (c) M coincides with G   (d) None of these

      iv. Pressure head and datum head are known as-   **1**
           (a) Hydraulic grade line   (b) Total energy line
           (c) Prandtl head   (d) None of these

      v.   Dimensional analysis is useful in-   **1**
           (a) Checking the correctness of a physical equation
           (b) Determining the number of variables involved in a particular
               phenomenon
           (c) Determining the dimensionless groups from the given
               variables
           (d) The exact formulation of a physical phenomenon

      vi. Which of the following quantities has the dimensions $M^0L^0T^0$?   **1**
           (a) Perimeter   (b) Density   (c) Strain   (d) Stress

      vii. Which one of the following is a major loss?   **1**
           (a) Frictional loss   (b) Shock loss
           (c) Entry loss   (d) None of these

                                                                    P.T.O.

viii. Energy gradient line takes into consideration- **1**
(a) Potential and kinetic heads only
(b) Potential and pressure heads only
(c) Kinetic and pressure heads only
(d) Potential, kinetic and pressure heads

ix. For a channel to be economic which of the following parameters **1**
should be minimum?
(a) Wetted perimeter   (b) Wetted area
(c) Section factor   (d) Hydraulic depth

x. Calculate the hydraulic radius for the most economical rectangular **1**
section having depth y and width B.
(a) y/2   (b) y   (c) 2y   (d) 3y

Q.2   Attempt any two:

i. Explain the following terms in detail: **5**
(a) Viscosity   (b) Compressibility
(c) Surface Tension   (d) Capillarity
(e) Specific weight

ii. With neat sketches, explain the conditions of equilibrium for **5**
floating and sub-merged bodies.

iii. What is the relation between gauge pressure, absolute pressure, **5**
vacuum pressure and atmospheric pressure?

Q.3 i. Deduce an expression for showing equipotential line and **4**
streamline are perpendicular to each other.

ii. What is venturimeter? Derive the formula for calculation of flow **6**
from venturimeter.

OR iii. Deduce an expression for Bernoulli's equation also mention its **6**
assumption.

Q.4   Attempt any two:

i. What are the various method of dimensional analysis? Explain any **5**
one of them.

ii. State the reason for constructing a distorted model. Discuss the **5**
various type of distortion in model.

iii. Explain the dimensional homogeneity, with an example. **5**

Q.5   Attempt any two:

i. Derive the loss of head due to friction in pipe flow-Darcy **5**
equation.

ii. Write about Hardy cross method. **5**

iii. Write short note on water hammer effect. **5**

Q.6 i. What is specific energy curve? Draw specific energy curve **4**
depicting different regime of flow.

ii. Find the velocity of flow and rate of flow of water through a **6**
rectangular channel of 6m wide and 3m deep, when it is running
full. The channel is having bed slope as 1 in 2000.Take Chezy's
constant C=55.

OR iii. Derive all the conditions for most economical rectangular section. **6**

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Scheme of Marking

Note: The Paper Setter should provide the answer wise splitting of the marks in the scheme below.

Q.1	i)	Which of the following is the basic principle of fluid mechanics? (D) **All of the mentioned**	1
	ii)	The CGS unit of kinematic viscosity is (C) cm2/sec	1
	iii)	In the case of floating body for stable equilibrium (A)M is above G	1
	iv)	Pressure head and datum head as known as (A) Hydraulic grade line	1
	v)	Dimensional analysis is useful in (C)determining the dimensionless groups from the given variables	1
	vi)	Which of the following quantities has the dimensions M0L0T0? c)Strain	1
	vii)	Which one of the following is a major loss? (A) Frictional Loss	1
	viii)	Energy gradient line takes into consideration (D) potential, kinetic and pressure heads	1
	ix)	For a channel to be economic which of the following parameters shouldbeminimum. a)Wettedperimeter	1
	x)	Calculate the hydraulic radius for the most economical rectangular section having depth y and width B. c)2y	1

Q.2	i.	Explain the following terms in details: i) Viscosity **1 mark** ii) Compressibility **1 mark** iii) Surface Tension **1 mark** iv) Capillarity **1 mark** v) specific weight **1 mark**	5
	ii.	neat sketches, **1 mark** conditions of equilibrium for floating bodies **2 mark** conditions of equilibrium for sub-merged bodies. **2 mark**	5
OR	iii.	What is the relation between gauge pressure, absolute pressure, vacuum pressure and atmospheric pressure **5 Marks**	5
Q.3	i.	expression for showing equipotential line and streamline are perpendicular to each other ? **4 marks**	4
	ii.	What is venturimeter? **1 mark** Derive the formula for calculation of flow from venturimeter? **5 marks**	6
OR	iii.	expression for bernoulli's equation **5marks** also mention its assumption **1 mark**	6
Q.4	i.	various method of dimensional analysis? **3 marks** explain any one of them ? **2 marks**	5
	ii.	State the reason for constructing a distorted model? **2 marks** discuss the various type of distortion in model? **3marks**	5
OR	iii.	Explain the dimensional homogeneity, **4 marks** example. **1 mark**	5
Q.5	i.	Derive the loss of head due to friction in pipe flow-Darcy equation? **5marks**	5
	ii.	Write about Hardy cross method? **5 marks**	5
OR	iii.	Write short note on water hammer effect? **5 marks**	5
Q.6	i	What is specific energy curve ? **2 marks**	4

		Draw specific energy curve depicting different regime of flow?**2 marks**	
	ii	Velocity **3 marks** Discharge **3 marks**	**6**
	iii	Both condition **3 marks each**	**6**

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