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B.E. / B.TECH. DEGREE EXAMINATIONS, DEC 2019

Third Semester

CH16304 – FLUID MECHANICS*(Chemical Engineering)***(Regulation 2016)**

Time: Three Hours

Maximum : 100 Marks

Answer ALL questions

PART A - (10 X 2 = 20 Marks)

	CO	RBT
1. State Newton's law of viscosity.	1	R
2. Oil has a kinematic viscosity of 1.25 cm²/s and a specific gravity of 0.80 . Determine dynamic (absolute) viscosity in kg/(m·s).	1	AP
3. State Pascal's law of hydrostatics.	2	R
4. Explain about metacentre and metacentric height.	2	U
5. Explain about boundary layer with respect to fluid flow.	3	U
6. What is minimum fluidization velocity?	3	R
7. What is NPSH of a pump and state its importance?	4	U
8. What is a vacuum pump and how it is different from regular pump?	4	U
9. State the principle of dimensional homogeneity.	5	R
10. State Buckingham's π - Theorem.	5	R

PART B - (5 X16 = 80 Marks)

11. (a) Explain in detail about the rheological behavior of various Non-Newtonian fluids with examples. (16) 1 U
- (OR)**
- (b) Explain in detail about the various flow patterns which can be applied for flow visualization. (16) 1 U
12. (a) (i) The right limb of a simple U-tube manometer containing mercury (density **13600 Kg/m³**) is open to the atmosphere while the left limb is connected to a pipe in which oil of density **700 kg/m³** is flowing. The centre of the pipe is **10 cm** below the level of mercury in the right limb. Find the pressure of oil in **N/m²** in the pipe if the difference of mercury in the two limbs is **10 cm**. (8) 2 AP

- (ii) Oil of density **700 kg/m³** is flowing through a pipe having diameters **30 cm** and **20 cm** at **sections A** and **B** respectively. The rate of flow through pipe is **25 litres/s**, **section A** is **5 m** above datum and **section B** is **3 m** above datum. If the pressure at **section A** is **1.5 atm**, find the intensity of pressure at **section B**.

(8) 2 AP

(OR)

- (b) (i) A pipe of diameter **400 mm** carries water at a velocity of **25 m/s**. The pressure at the points **A** and **B** are given as **29.43 N/cm²** and **22.563 N/cm²** respectively, while the datum head at **A** and **B** are **28 m** and **30 m**. Find the loss of head between **A** and **B**.
- (ii) Derive the continuity equation for a cartesian co-ordinates system.
13. (a) Derive Hagen-poiseuille equation.
- (OR)
- (b) Derive Ergun equation.
14. (a) (i) Explain the principle and working of rotameter.
- (ii) Derive the volumetric flow rate expression for venturimeter.
- (OR)
- (b) (i) Explain about cavitation and water hammer in detail.
- (ii) Interpret the advantages of reciprocating pumps with centrifugal pumps and vice-versa.
15. (a) (i) Explain in detail about similitude and types of similarity.
- (ii) For dynamic similarity demonstrate how various model laws can be applied for designing models in detail.
- (OR)
- (b) The pressure difference ΔP in a pipe diameter D and length L due to viscous flow depend on the velocity V , viscosity μ , density ρ . Using Buckingham's π - Theorem, obtain an expression for ΔP .

(16) 3 AP

(16) 3 AP

(8) 4 U

(8) 4 AP

(8) 4 U

(8) 4 AP

(8) 5 U

(8) 5 AP

(16) 5 AP