8. b. Explain the terms
i) Pipes in parallel
ii) Equivalent pipe and Equivalent size of the pipe. **(CO4 K3) 8M**

(or)

9. a. Three pipes of length 800 m, 600 m and 300 m and diameter of 400 mm, 300 mm and 200 mm respectively are connected in series. The ends of the compound pipe is connected to two tanks, whose water surface levels are maintained at a difference of 15 m. Determine the rate of flow of water through the pipes if f = 0.005. what will be diameter of a single pipe of length 1700 m and f = 0.005 which replaces the three pipes. **(CO4 K2) 8M**

b. Describe an expression for loss of energy due to friction in pipe flow. **(CO4 K2) 7M**

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VR20 Reg. No: | | | | | | | | | | |

VELAGAPUDI RAMAKRISHNA

SIDDHARTHA ENGINEERING COLLEGE

(AUTONOMOUS)

II/IV B.Tech. DEGREE EXAMINATION, JANUARY, 2023

Third Semester

CIVIL ENGINEERING

20CE3304 FLUID MECHANICS

Time: 3 hours ***Max. Marks: 70***

Part-A is compulsory

Answer One Question from each Unit of Part - B

Answer to any single question or its part shall be written at one place only

PART-A

10 x 1 = 10M

1. a. Define vapour pressure. **(CO1 K1)**
b. Distinguish between absolute pressure and gauge pressure. **(CO1 K1)**
c. Define center of pressure. **(CO1 K1)**
d. Define rotational flow. **(CO2 K1)**
e. Define streak line. **(CO2 K1)**
f. Explain the terms velocity potential function and stream function. **(CO3 K1)**
g. Define the vena contracta. **(CO3 K1)**
h. Define hydraulic jump **(CO4 K1)**
i. What do you understand by the term minor energy loss? **(CO4 K1)**
j. What is the significance of Reynold's number? **(CO4 K1)**

PART-B

4 x 15 = 60M

UNIT-I

2. a. A plate having an area of 0.8 m^2 is sliding down the inclined plane at 45^0 to the horizontal with a velocity of 0.4 m/sec. There is a cushion of fluid 2 mm thick between the palne and the plate. Find the viscosity of the fluid, if the weight of the plate is 270 N. **(CO1 K3) 8M**

   b. Derive the Pascal law. **(CO1 K2) 7M**

(or)

3. a. Describe any five significant properties of fluids. **(CO1 K2) 8M**

   b. Derive an expression for hydrostatic force and center of pressure for vertical immersed plane surface. **(CO1 K2) 7M**

UNIT-II

4. a. Water flowing through the pipe 5cm dia pipe under pressure of 29.43 N/cm^2 with mean velocity 2 m/s and datum head is 5 m and find total head from Bernoulli's equation? **(CO2 K4) 8M**

   b. Derive Euler equation of motion and Bernoulli's equation from Euler equation. **(CO2 K2) 7M**

(or)

5. a. Explain the description of fluid motion and list out types of fluid flows with an example. **(CO2 K2) 8M**

   b. Derive the continuity equation in three dimensions for steady incompressible fluid flow. **(CO2 K2) 7M**

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UNIT-III

6. a. A venturimeter of 150 mm × 75 mm size is used to measure the flow rate of oil having specific gravity of 0.9. The reading shown by the U tube manometer connected to the venturimeter is 150 mm of mercury column. Calculate the coefficient of discharge for the venturimeter if the flow rate is 1.7 m^3/min. **(CO3 K2) 7M**

   b. Obtain an expression for discharge through large rectangular orifice. **(CO3 K2) 8M**

(or)

7. a. Water flow through a pipe AB 1.2 m diameter at 3 m/s and then pass through a pipe BC of diameter 1.5 m diameter at C pipe becomes branches, CD which having diameter of 0.8 m and velocity is one third of velocity AB pipe. Velocity of CE is 2.5 m/s, find velocity of BC, CE and Dia of CE. **(CO3 K4) 7M**

   b. The actual velocity of a liquid issuing through a 7 cm diameter orifice fitted in an open tank is 6 m/s under a head of 3 m. If the discharge measured in a collecting tank is 0.020 m^3/s, calculate the coefficient of velocity, coefficient of contraction and the theoretical discharge through the orifice. **(CO3 K4) 8M**

UNIT-IV

8. a. In a circular pipe of diameter 100 mm of a fluid of viscosity 7 poise and specific gravity 1.3 is flowing. If the maximum shear stress at the wall of pipe 196.2 N/m^2 Determine,
   i) The pressure gradient ii) The average velocity
   iii) Reynolds number of flow. **(CO4 K4) 7M**