Total No. of Questions – [3] Total No. of Printed Pages: 2

| G.R. No. | |
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CODE - V212-224 (ESE-DSY)

**JULY 2023 - ENDSEM EXAM**

**S. Y. B. TECH. (Civil) (DSY)**

**ACAD.YEAR:2022-23 (SEMESTER - I)**

**COURSE NAME: FLUID MECHANICS**

**COURSE CODE: CVUA21204**

**(PATTERN 2020)**

Time: [1Hr] [Max. Marks: 30]

**(*) Instructions to candidates:**

1) **Use of scientific calculator is allowed**
2) **Use suitable data where ever required**
3) **All questions are compulsory**

| Question No. | Question Description | Max. Marks | CO mapped | BT Level |
|---|---|---|---|---|
| Q.1 | a) Draw a neat diagram of static pitot tube and explain it's working. Derive the expression for velocity measurement by pitot tube. | 4 | 4 | A |
| | b) A venturimeter of throat diameter 5 cm is fitted into a 12.5 cm diameter pipeline. Determine the flow in the pipe when the reading of differential U tube Manometer is 20 cm. If the energy loss in the downstream part of divergent cone is 10 times the velocity head in pipe, calculate the total head loss. Take $C_d$ = 0.96. | 6 | 4 | E |
| | **OR** | | | |
| | c)The horizontal venturimeter with inlet and throat diameters 300 mm and 100 mm respectively is used to measure the rate of flow of water. The pressure intensity at the inlet is 130 KN/m$^2$ while the vacuum pressure head at the throat is 35 cm of mercury. Assuming that 3% of head is lost in between the inlet and the throat, Find 1) The value of coefficient of discharge for the venturimeter 2) rate of flow. | 6 | 4 | E |
| Q.2 | a) Prove that in case of two dimensional steady uniform laminar flow , shear stress gradient is equal to the pressure gradient. | 4 | 5 | A |
| | b) Find the displacement thickness, the momentum thickness and energy thickness for the velocity distribution in the boundary | 6 | 5 | E |

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|---|---|---|---|---|
| | layer given by $\frac{u}{U} = 2\left(\frac{y}{\delta}\right) - \left(\frac{y}{\delta}\right)^2$ | | | |
| | **OR** | | | |
| | c) A 2m wide and 5 m long plate is moving in air with a velocity of 2m/s parallel to its length. Density of air is 1.2 Kg/ $m^3$ and viscosity is 1.8. x $10^{-4}$ poise. Determine drag force on one face of the plate assuming that<br>1) boundary layer is laminar over the complete plate<br>2) boundary layer is turbulent over the complete plate | 6 | 5 | E |
| **Q.3** | a) Derive an equation for frictional losses for flow through pipes as $h_f = \frac{flv^2}{2gD}$ | 4 | 6 | A |
| | b) A compound piping system consists of 1800 m of 0.50 m, 1200 m of 0.40 m and 600 m of 0.30 m new cast iron pipes connected in series. Convert the system to (a) an equivalent length of 0.40 m pipe, and (b) and equivalent size pipe 3600 m long. | 6 | 6 | E |
| | **OR** | | | |
| | c) Two pipes each 300 m long are available for connecting to a reservoir from which a flow of 0.085 $m^3/s$ is required. If the diameters of the two pipes are 0.30 m and 0.15 m respectively, determine the ratio of the head lost when the pipes are connected in series to the head lost when they are connected in parallel. Neglect minor losses. | 6 | 6 | E |