



ONLINE CLASS ENGAGEMENT REPORT FOR THE SUBJECT FLUID MECHANICS

Module 1: Numericals on Manometers (2021-05-11 at 02:35 GMT-7)

Problem 2.11 A U-Tube manometer is used to measure the pressure of water in a pipe line, which is in excess of atmospheric pressure. The right limb of the manometer contains mercury and is open to atmosphere. The contact between water and mercury is in the left limb. Determine the pressure of water in the main line, if the difference in level of mercury in the limbs of U-tube is 10 cm and the free surface of mercury is in level with the centre of the pipe. If the pressure of water in pipe line is reduced to 9810 N/m², calculate the new difference in the level of mercury. Sketch the arrangement in both cases.

Given:
 $\rho_1 = 1000 \text{ kg/m}^3$
 $h_1 = 0.1 \text{ m}$
 $\rho_2 = 13600 \text{ kg/m}^3$
 $h_2 = 0.1 \text{ m}$

Equating the pressure in left & right limb:
 $P_A + \rho_1 g h_1 = \rho_2 g h_2$
 $P_A = (\rho_2 g h_2) - (\rho_1 g h_1)$
 $P_A = (13600 \times 9.81 \times 0.1) - (1000 \times 9.81 \times 0.1)$
 $P_A = 12360.6 \text{ N/m}^2$
 $P_A = 12.3606 \text{ kN/m}^2$
 Add to 9810 N/m²

Equating the pressure in left & right limb:
 $P_A + \rho_1 g h_1 = \rho_2 g h_2$
 $9810 = [13600 \times 9.81 \times (0.1 - 2y)] - [1000 \times 9.81 \times (0.1 - y)]$
 $9810 = [133416 (0.1 - 2y)] - [9810 (0.1 - y)]$
 $9810 = [13341.6 - 26683.2y] - [981 + 9810y]$
 $9810 = 12360.6 - 27664.2y$
 $27664.2y = 12360.6 - 9810$
 $y = 0.00922 \text{ mtr}$



Vaddin Chetan

Module 3: Numericals on Bernoulli's equation for Real Fluid (2021-05-25 at 21:35 GMT-7)

A pump has a tapering pipe running full of water. The pipe is placed vertically with the diameters at the base and top being 1.2 m and 0.6 m respectively. The pressure at the upper end is 240 mm of Hg vacuum, while the pressure at the lower end is 15 kN/m². Assume the head loss to be 20% of difference of velocity head. Calculate the discharge, the flow is vertically upwards and difference of elevation is 3.9 m.

Given:
 $d_1 = 1.2 \text{ m}$
 $d_2 = 0.6 \text{ m}$
 $P_2 = -240 \text{ mm of Hg}$
 $P_1 = 15 \times 10^3 \text{ N/m}^2$
 $h_L = 20\% \left[\frac{V_1^2}{2g} - \frac{V_2^2}{2g} \right]$
 $h_L = 0.2 \left[\frac{V_1^2}{2g} - \frac{V_2^2}{2g} \right]$
 $(Z_2 - Z_1) = 3.9 \text{ m}$

Continuity Equation:
 $A_1 V_1 = A_2 V_2$
 $V_2 = \frac{A_1}{A_2} V_1 = \frac{1.44}{0.36} V_1 = 4 V_1$

Bernoulli's Equation:
 $\frac{P_1}{\rho g} + \frac{V_1^2}{2g} + Z_1 = \frac{P_2}{\rho g} + \frac{V_2^2}{2g} + Z_2 + h_L$
 $\frac{15 \times 10^3}{1000 \times 9.81} + \frac{V_1^2}{2 \times 9.81} + 0 = \frac{-32019.8}{1000 \times 9.81} + \frac{V_2^2}{2 \times 9.81} + 3.9 + 0.2 \left(\frac{V_1^2}{2 \times 9.81} - \frac{V_2^2}{2 \times 9.81} \right)$
 $1.5290 + 0.0509 V_1^2 = (-3.2639) + 0.0509 V_2^2 + 3.9 + 0.0101 (V_1^2 - V_2^2)$
 $1.5290 + 0.0509 V_1^2 = 0.6361 + 0.0509 V_2^2 - 0.0101 V_1^2 + 0.0101 V_2^2$
 $0.9144 V_1^2 + 0.1616 V_2^2 = 0.1011 V_1^2 - 0.0509 V_2^2$
 $0.915 V_1^2 = 0.8929$
 $V_1^2 = \frac{0.8929}{0.915}$
 $V_1 = \sqrt{0.97584}$
 $V_1 = 0.9878 \text{ m/sec}$
 $V_2 = 4 V_1 = 3.9512 \text{ m/sec}$



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Differential Manometers:
 - U-tube differential Manometer
 - Inverted U-tube "

$(P_A - P_B) = ?$

Pressure in the left limb above x-x:

$= P_A + \rho_1 g (h+x) \rightarrow (1)$

Pressure in the right limb above x-x:

$= P_B + \rho_2 g y + \rho_3 g h_3 \rightarrow (2)$

$(1) = (2)$
 $P_A + \rho_1 g (h+x) = P_B + \rho_2 g y + \rho_3 g h$

$(P_A - P_B) = \rho_2 g y + \rho_3 g h - \rho_1 g (h+x)$

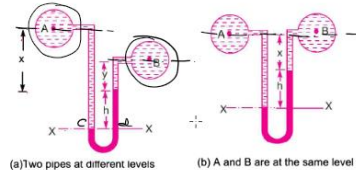
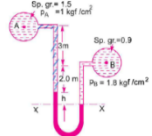


Fig. 2.18 U-tube differential manometers.

A differential manometer is connected at the two points A and B of two pipes as shown in Fig. 2.19. The pipe A contains a liquid of sp. gr. = 1.5 while pipe B contains a liquid of sp. gr. = 0.9. The pressures at A and B are 1 kgf/cm² and 1.80 kgf/cm² respectively. Find the difference in mercury level in the differential manometer.

$S_A = 1.5$
 $S_B = 0.9$
 $P_A = 1 \text{ kgf/cm}^2 \rightarrow \text{N/m}^2 = ?$
 $P_B = 1.8 \text{ kgf/cm}^2$
 $h = ?$
 $\rho_A = 1.5 \times 1000 = 1500 \text{ Kg/m}^3$
 $\rho_B = 0.9 \times 1000 = 900 \text{ Kg/m}^3$
 $\rho_m = 13600 \text{ Kg/m}^3$
 $P_A = 1 \times 10^4 \text{ kgf/m}^2$
 $P_A = 9.81 \times 10^4 \text{ N/m}^2$
 $P_B = 1.8 \times 9.81 \times 10^4 \text{ N/m}^2$
 $P_B = 17.658 \times 10^4 \text{ N/m}^2$

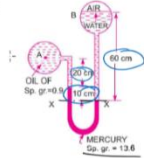


Pressure above x-x in left limb
 $= P_A + \rho_A g h_2 + \rho_m g h$
 $= 9.81 \times 10^4 + (1500 \times 9.81 \times 5) + (13600 \times 9.81 \times h)$
 $= 9.81 \times 10^4 + 73575 + 133416 h$
 $= 171675 + 133416 h \rightarrow (1)$

Pressure above x-x in right limb
 $= P_B + \rho_B g (2+h)$
 $= 17.658 \times 10^4 + [900 \times 9.81 (2+h)]$
 $= 17.658 \times 10^4 + 17658 + 8829 h$
 $= 194238 + 8829 h \rightarrow (2)$

$(1) = (2)$
 $171675 + 133416 h = 194238 + 8829 h$
 $133416 h - 8829 h = 194238 - 171675$
 $124587 h = 22563$
 $h = \frac{22563}{124587}$
 $h = 0.1811 \text{ m}$
 $h = 18.1102562 \text{ cm}$

A differential manometer is connected at the two points A and B as shown in Fig. 2.20. At B air pressure is 9.81 N/cm² (abs), find the absolute pressure at A.



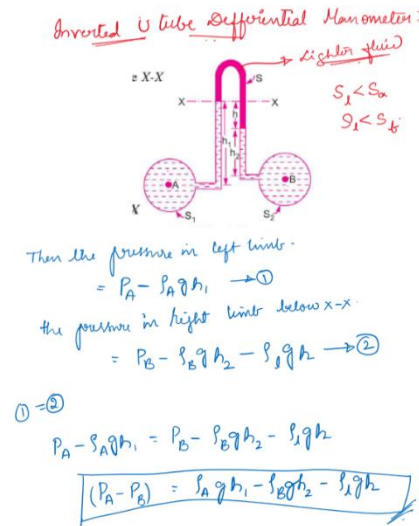
$S_A = 0.9$
 $\rho_A = 0.9 \times 1000 = 900 \text{ Kg/m}^3$
 $\rho_B = 1000 \text{ Kg/m}^3$
 $\rho_m = 13600 \text{ Kg/m}^3$
 $P_B = 9.81 \times 10^4 \text{ N/m}^2$

$P_A + \rho_A g h_A + \rho_m g h_m = P_B + \rho_B g h_B$
 $P_A = P_B + \rho_B g h_B - \rho_A g h_A - \rho_m g h_m$
 $P_A = 9.81 \times 10^4 + (1000 \times 9.81 \times 0.6) - (900 \times 9.81 \times 0.2) - (13600 \times 9.81 \times 0.1)$
 $= 9.81 \times 10^4 + 5886 - 1765.8 - 13341.6$

$P_A = 88878.6 \text{ N/m}^2$
 $P_A = 8.88786 \times 10^4 \text{ N/m}^2$
 $P_A = 8.88786 \text{ N/cm}^2$



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YouTube channel page for Vaddin Chetan (220 subscribers). The page shows a grid of video uploads including:

- Department Lab Tour (32 views)
- Centre for Innovation, Innovation, Incubation &... (147 views)
- How to Schedule Online classes in Google Classroom (177 views)
- RYMEC-Mechanical Dept's Centre of Excellence by TAT... (140 views)
- RYMEC-Mechanical Dept. Social Responsibility (80 views)
- Velocity & Acceleration analysis of Mechanisms... (75 views)
- Velocity & Acceleration Analysis of Mechanisms... (136 views)
- Velocity & Acceleration Analysis of Mechanisms... (159 views)
- Velocity Analysis of Mechanisms (Graphical... (76 views)
- Velocity Analysis of Mechanisms (Graphical... (104 views)
- Velocity Analysis of Mechanisms (Graphical... (144 views)
- Kinematics of Machines_CAMS (118 views)
- Kinematics of Machines_CAMS (222 views)
- BSW Thread (1.1K views)
- Sellers Thread (420 views)
- ACME Thread (338 views)
- Square Thread (170 views)
- ISO Metric (Internal & External) (1.5K views)

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- Velocity & Acceleration analysis of Mechanisms... (75 views)
- Velocity & Acceleration Analysis of Mechanisms... (136 views)
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- ACME Thread (338 views)
- Square Thread (170 views)
- ISO Metric (Internal & External) (1.5K views)
- Apporra Milana 2018 (577 views)
- Lathe Square Tool Post Assembly (4K views)
- Machine Vice Assembly (2.6K views)
- Plumber Block Assembly (3.9K views)
- FDP201X_OER_Screw Jack (181 views)
- Screw Jack Assembly (4K views)



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| Attendance for: | Class List | | | | | | | | | | | | | | | | |
|--------------------------|--------------------------------|---------|--------|----------------|---------------|--------|--------|---------------------------|--|--|--|--|--|--|--------------------------|--|--|
| Date: | "2021-05-05" | "Time:" | "9:29" | "Meet ID:" | "vpu-his-sph" | | | | | | | | | | | | |
| Names | "2021-05-05" | "Email" | "Com" | "Arrival time" | "Last" | "# of" | "Join" | "Details" | | | | | | | | | |
| Akshatha Achu | "✓" | "" | "Com" | "10:02" | "9:46" | "63" | "4" | "9:29 (2min) [9:30]" | | | | | | | "10:35 (12min) [10:46] | | |
| Ajeema Ammu | "✓" | "" | "Com" | "10:07" | "9:53" | "29" | "2" | "9:37 (23min) [9:59]" | | | | | | | "10:07 (6min) [10:12] | | |
| Manish Arijun | "✓" | "" | "Com" | "9:31" | "9:47" | "17" | "1" | | | | | | | | | | |
| Sai Charith. B | "✓" | "" | "Com" | "10:19" | "9:58" | "73" | "3" | "9:59 (20min) [10:18]" | | | | | | | "10:19 (26min) [10:44] | | |
| Srinivas B | "✓" | "" | "Com" | "10:07" | "9:47" | "20" | "2" | "10:07 (3min) [10:09]" | | | | | | | "9:31(17min) [9:47] | | |
| Vishwanath Brm | "✓" | "" | "Com" | "9:31" | "9:32" | "64" | "2" | "9:31(2min) [9:32]" | | | | | | | "9:46 (62min) [10:47] | | |
| Vaddin Chetan | "✓" | "" | "Com" | "9:29" | "10:49" | "222" | "3" | "9:29 (77min) [10:49]" | | | | | | | "9:31(73min) [10:49] | | |
| Giri G | "✓" | "" | "Com" | "9:34" | "10:17" | "44" | "1" | | | | | | | | | | |
| Sangeetha. G | "✓" | "" | "Com" | "9:29" | "10:44" | "76" | "1" | | | | | | | | | | |
| Ni Gifts | "✓" | "" | "Com" | "10:02" | "9:55" | "16" | "4" | "10:02 (6min) [10:09]" | | | | | | | "9:54 (2min) [9:55] | | |
| Sindhu Gn | "✓" | "" | "Com" | "10:20" | "9:46" | "69" | "4" | "9:45 (35min) [10:19]" | | | | | | | "10:20 (15min) [10:34] | | |
| Pradeep Kumar H | "✓" | "" | "Com" | "9:48" | "10:16" | "29" | "1" | | | | | | | | | | |
| Harisha Harisha | "✓" | "" | "Com" | "9:39" | "10:40" | "56" | "1" | | | | | | | | | | |
| Moula Hussain | "✓" | "" | "Com" | "10:34" | "10:42" | "9" | "1" | | | | | | | | | | |
| Keerti K | "✓" | "" | "Com" | "9:31" | "10:42" | "72" | "1" | | | | | | | | | | |
| Shankar N K | "✓" | "" | "Com" | "10:01" | "9:51" | "69" | "3" | "9:56 (6min) [10:01]" | | | | | | | "9:31(21min) [9:51] | | |
| M Sai Karthik | "✓" | "" | "Com" | "9:32" | "9:56" | "19" | "2" | "9:53 (4min) [9:56]" | | | | | | | "9:32 (15min) [9:46] | | |
| Sam Khan | "✓" | "" | "Com" | "10:35" | "9:46" | "73" | "3" | "9:30 (17min) [9:46]" | | | | | | | "10:35 (11min) [10:46] | | |
| Akshay Kumar | "✓" | "" | "Com" | "9:47" | "9:48" | "2" | "1" | | | | | | | | | | |
| Kartik Kundagol | "✓" | "" | "Com" | "9:30" | "9:55" | "30" | "2" | "9:30 (26min) [9:55]" | | | | | | | "9:58 (4min) [10:01] | | |
| Darshan D M | "✓" | "" | "Com" | "9:30" | "10:09" | "40" | "1" | | | | | | | | | | |
| Navaneeth M | "✓" | "" | "Com" | "10:01" | "10:42" | "42" | "1" | | | | | | | | | | |
| Priyanka M | "✓" | "" | "Com" | "10:09" | "10:09" | "1" | "1" | | | | | | | | | | |
| Soma Shekar K M | "✓" | "" | "Com" | "9:29" | "9:29" | "1" | "1" | | | | | | | | | | |
| M.Vishwa M.Vishwa | "✓" | "" | "Com" | "9:34" | "9:47" | "61" | "2" | "9:34 (14min) [9:47]" | | | | | | | "9:48 (47min) [10:34] | | |
| Shareef N | "✓" | "" | "Com" | "9:53" | "10:46" | "53" | "1" | | | | | | | | | | |
| Laxmipathi Nayak | "✓" | "" | "Com" | "9:38" | "10:00" | "16" | "1" | | | | | | | | | | |
| Giridhara R | "✓" | "" | "Com" | "9:29" | "10:44" | "76" | "1" | | | | | | | | | | |
| Shiva Raj K R | "✓" | "" | "Com" | "10:17" | "9:34" | "71" | "3" | "10:17 (26min) [10:42]" | | | | | | | "9:33 (2min) [9:34] | | |
| Venkat Rahul | "✓" | "" | "Com" | "9:34" | "10:46" | "72" | "1" | | | | | | | | | | |
| Janardhan Reddy | "✓" | "" | "Com" | "9:50" | "9:56" | "7" | "1" | | | | | | | | | | |
| B. Sandeep | "✓" | "" | "Com" | "10:10" | "9:35" | "43" | "3" | "9:32 (4min) [9:35]" | | | | | | | "10:10 (3min) [10:12] | | |
| Prashanthi Sharma | "✓" | "" | "Com" | "9:29" | "10:49" | "81" | "1" | | | | | | | | | | |
| Soma Shekar | "✓" | "" | "Com" | "9:30" | "9:32" | "69" | "2" | "9:30 (3min) [9:32]" | | | | | | | "9:39 (66min) [10:44] | | |
| Surendra Suri | "✓" | "" | "Com" | "9:57" | "10:41" | "45" | "1" | | | | | | | | | | |
| Bhagvan Swaroop | "✓" | "" | "Com" | "10:04" | "10:34" | "45" | "2" | "9:49 (14min) [10:02]" | | | | | | | "10:04 (31min) [10:34] | | |
| Manish Teja | "✓" | "" | "Com" | "9:29" | "10:34" | "66" | "1" | | | | | | | | | | |
| Pawan Yadav | "✓" | "" | "Com" | "10:02" | "9:46" | "42" | "3" | "9:46 (16min) [10:01]" | | | | | | | "9:29 (18min) [9:46] | | |
| Vamshi Yadav | "✓" | "" | "Com" | "9:46" | "10:44" | "58" | "1" | | | | | | | | | | |
| Avinash Ym | "✓" | "" | "Com" | "9:29" | "10:44" | "76" | "1" | | | | | | | | | | |
| Help/more info: | "https://tinyurl.com/y5peu3nk" | | | | | | | | | | | | | | | | |
| © Google Meet Attendance | "https://tinyurl.com/y6k2yqts" | | | | | | | | | | | | | | | | |

| Names | "2021-05-05" | "Email" | "Com" | "Arriv" | "Last Seen" | "# of" | "Join" | "Deta" | | | | | | |
|--------------------------|--------------------------------|---------|-------|---------|-------------|--------|--------|--|--|--|--|--|--|--|
| Akshatha Achu | "✓" | "" | "Com" | "14:58" | "16:09" | "69" | "4" | "15:47 (2: 15:38 (8m 14:58 (3m 15:04 (35min) [15:38] | | | | | | |
| Ajeema Ammu | "✓" | "" | "Com" | "14:55" | "16:09" | "75" | "1" | | | | | | | |
| Sai Charith. B | "✓" | "" | "Com" | "15:01" | "16:08" | "68" | "1" | | | | | | | |
| Srinivas B | "✓" | "" | "Com" | "15:00" | "15:38" | "39" | "1" | | | | | | | |
| Khadhar Basha | "✓" | "" | "Com" | "14:54" | "16:08" | "75" | "1" | | | | | | | |
| Vishwanath Brm | "✓" | "" | "Com" | "15:04" | "16:08" | "65" | "3" | "15:50 (1: 15:51 (18n 15:04 (46min) [15:49] | | | | | | |
| Vaddin Chetan | "✓" | "" | "Com" | "14:56" | "16:09" | "135" | "3" | "15:08 (4: 15:57 (12n 14:56 (74min) [16:09] | | | | | | |
| Sangeetha. G | "✓" | "" | "Com" | "14:54" | "16:08" | "75" | "1" | | | | | | | |
| Vamshi G | "✓" | "" | "Com" | "15:05" | "16:08" | "64" | "1" | | | | | | | |
| Sindhu Gn | "✓" | "" | "Com" | "14:59" | "16:08" | "70" | "2" | "15:43 (2: 14:59 (44min) [15:43] | | | | | | |
| Pradeep Kumar H | "✓" | "" | "Com" | "14:58" | "15:41" | "44" | "1" | | | | | | | |
| Harisha Harisha | "✓" | "" | "Com" | "15:42" | "15:59" | "18" | "1" | | | | | | | |
| Akshata Hiremath | "✓" | "" | "Com" | "16:08" | "16:09" | "2" | "1" | | | | | | | |
| Moula Hussain | "✓" | "" | "Com" | "15:10" | "15:40" | "31" | "1" | | | | | | | |
| Keerti K | "✓" | "" | "Com" | "15:08" | "15:56" | "49" | "1" | | | | | | | |
| Rambabu K | "✓" | "" | "Com" | "15:00" | "15:13" | "14" | "1" | | | | | | | |
| Shankar N K | "✓" | "" | "Com" | "14:57" | "15:56" | "54" | "3" | "15:00 (3: 15:39 (18n 14:57 (2min) [14:58] | | | | | | |
| Malli Karjun | "✓" | "" | "Com" | "15:26" | "16:09" | "44" | "3" | "16:00 (1: 15:26 (10n 15:36 (24min) [15:59] | | | | | | |
| M Sai Karthik | "✓" | "" | "Com" | "14:53" | "16:09" | "77" | "1" | | | | | | | |
| Sam Khan | "✓" | "" | "Com" | "15:23" | "15:59" | "37" | "2" | "15:51 (9: 15:23 (28min) [15:50] | | | | | | |
| Boya Kiran Kumar | "✓" | "" | "Com" | "15:02" | "15:38" | "37" | "1" | | | | | | | |
| Shivu Kumar | "✓" | "" | "Com" | "16:08" | "16:08" | "1" | "1" | | | | | | | |
| Darshan D M | "✓" | "" | "Com" | "14:59" | "16:08" | "69" | "1" | | | | | | | |
| Soma Shekar K M | "✓" | "" | "Com" | "14:56" | "16:08" | "73" | "1" | | | | | | | |
| Masthan , | "✓" | "" | "Com" | "14:56" | "16:08" | "73" | "3" | "15:23 (1: 14:56 (27n 15:37 (32min) [16:08] | | | | | | |
| Md Mustak | "✓" | "" | "Com" | "15:04" | "15:49" | "46" | "1" | | | | | | | |
| Meghana N | "✓" | "" | "Com" | "15:06" | "15:40" | "35" | "1" | | | | | | | |
| Giridhara R | "✓" | "" | "Com" | "14:56" | "16:08" | "73" | "3" | "14:57 (5: 14:56 (1m 15:54 (15min) [16:08] | | | | | | |
| Shiva Raj K R | "✓" | "" | "Com" | "15:01" | "16:09" | "69" | "1" | | | | | | | |
| Venkat Rahul | "✓" | "" | "Com" | "15:00" | "16:08" | "69" | "1" | | | | | | | |
| Janardhan Reddy | "✓" | "" | "Com" | "15:01" | "15:49" | "50" | "3" | "15:01 (2: 15:27 (5m 15:31 (19min) [15:49] | | | | | | |
| Ismail Shaik | "✓" | "" | "Com" | "15:02" | "16:08" | "67" | "1" | | | | | | | |
| Prashanthi Sharma | "✓" | "" | "Com" | "14:59" | "16:09" | "70" | "1" | | | | | | | |
| Gagana Shree | "✓" | "" | "Com" | "14:57" | "16:08" | "72" | "2" | "16:08 (1: 14:57 (71min) [16:07] | | | | | | |
| Manish Teja | "✓" | "" | "Com" | "14:58" | "16:08" | "71" | "1" | | | | | | | |
| Pawan Yadav | "✓" | "" | "Com" | "15:04" | "15:26" | "23" | "1" | | | | | | | |
| Avinash Ym | "✓" | "" | "Com" | "14:56" | "16:08" | "73" | "1" | | | | | | | |
| Help/more info: | "https://tinyurl.com/y5peu3nk" | | | | | | | | | | | | | |
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