**C. V. RAMAN POLYTECHNIC**

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| **4th SEMESTER/ MECHANICAL ENGINEERING** |
| **TH-3 FLUID MECHANICS (FM)** |
|  **Figures in the right-hand margin indicates marks** |

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| Q1. | **Answer All questions** | 2 x 10 |
|  | Define Archimedes principle and concept of buoyancy. | 2 |
|  | Explain the term Surface Tension | 2 |
|  | State Pascal's law  | 2 |
|  | Explain metacentre and metacentric height. | 2 |
|  | Define viscosity and kinematic viscosity  | 2 |
|  | Give the expression for head loss due to friction by Darcy-Weisbach and Chezy’s formula. | 2 |
|  | Explain capillary rise and capillary fall with a neat sketch | 2 |
|  | Derive hydraulic co-efficient. | 2 |
|  | Discuss various types of pressures with a neat sketch  | 2 |
|  | Discuss Hydraulic Gradient Lines and Total Energy Lines | 2 |
| Q2. | **Answer Any Six Questions** | 5 x 6 |
| a. |  Derive the condition for stability of floating body explaining the conditions for floatation. | 5 |
| b. |  Find the loss of head due to friction in a pipe of diameter 300mm and length 50m through which water is flowing at a rate of 3m/s using 1. Darcy formula
2. Chezy’s formula

C=60, ν=0.01 stoke | 5 |
| c. |  Prove continuity equation for one-dimensional flow. | 5 |
| d. |  Find the velocity of flow of an oil through a pipe when the difference of mercury level in a differential U-tube manometer connected to two tappings of the pitot tube is 100mm. Take Cv=0.98 and specific gravity of oil as 0.8. | 5 |
| e. |  The head of water over an orifice of diameter 40mm is 10m. Find the actual discharge and actual velocity of the jet at vena-contracta. Take Cd=0.6 and Cv=0.98. | 5 |
| f. | Explain HGL and TEL with a neat sketch | 5 |
| g. | An oil of specific gravity 0.8 is flowing through a venturimeter having inlet diameter 20cm and throat diameter 10cm respectively. The oil mercury differential manometer shows a reading of 25cm. Calculate the discharge of oil through the horizontal venturimeter. Take Cd=0.98 | 5 |
|  | **Answer any three questions** | 10 x 3 |
| Q3. | Describe with a neat sketch the working of a Bourdon tube pressure gauge. | 10 |
| Q4. |  A rectangular plane surface is 2m wide and 3m deep. It lies in vertical plane in water. Determine the total pressure and position of Center of Pressure (COP) on the plane surface when its upper edge is horizontal and 1. Coincides with water surface
2. 2.5m below the free surface of water
 | 10 |
| Q5. | State Bernoulli’s theorem. Derive Bernoulli’s equation and write its assumptions. | 10 |
| Q6. | Find the velocity of flow of an oil through a pipe when the difference of mercury level in a differential U-tube manometer connected to two tappings of the pitot tube is 100mm. Take Cv=0.98 and specific gravity of oil as 0.8. | 10 |
| Q7. | Find the velocity of flow of an oil through a pipe when the difference of mercury level in a differential U-tube manometer connected to two tappings of the pitot tube is 100mm. Take Cv=0.98 and specific gravity of oil as 0.8. | 10 |