Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_

****

**End Semester Examination – Nov / Dec – 2019**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Code :** | **18AT2001** | **Duration :** | **3hrs** |
| **Sub. Name :** | **FLUID MECHANICS AND OPEN CHANNEL HYDRAULICS** | **Max. Marks :** | **100** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Q. No.** | **Questions** | **Course Outcome** | **Marks** |
| **PART – A (20X1 = 20 MARKS)** | | | |
| 1. | Define real and ideal fluids. | CO1 | 1 |
| 2. | Define specific volume. | CO1 | 1 |
| 3. | Calculate the density of 1 litre petrol of specific gravity 0.7 | CO1 | 1 |
| 4. | Define compressibility. | CO1 | 1 |
| 5. | Differentiate between Rotational and Irrotational flow. | CO1 | 1 |
| 6. | Name the types of fluids. | CO1 | 1 |
| 7. | Mention the characterstics of laminar flow. | CO2 | 1 |
| 8. | What is Bernoulli’s theorem? | CO2 | 1 |
| 9. | Differentiate between weirs and notch. | CO2 | 1 |
| 10. | Write Chezy’s formula. | CO2 | 1 |
| 11. | Define Reynold’s number. | CO2 | 1 |
| 12. | State Froude’s number. | CO2 | 1 |
| 13. | A differential manometer is connected at the two points A and B. At B pressure is 9.81 N/cm2(abs). Find the absolute pressure at A. | CO2 | 1 |
| 14. | What is cavitation? | CO3 | 1 |
| 15. | Mention the types of manometers. | CO2 | 1 |
| 16. | Define centre of pressure. | CO2 | 1 |
| 17. | Define buoyancy. | CO3 | 1 |
| 18. | Define meta centre. | CO3 | 1 |
| 19. | What do you mean by Vorticity? | CO3 | 1 |
| 20. | Give the dimensions of the following:  (i) Torque (ii) Momentum | CO3 | 1 |

|  |  |  |  |
| --- | --- | --- | --- |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | |
| 21. | Explain different types of fluids. | CO1 | 5 |
| 22. | Explain Hydraulic jump. | CO2 | 5 |
| 23. | Two horizontal plates are palced 12.5 mm apart, the space between them is being  filled with Oil of viscosity 14 poise. Calculate the shear stress in the oil if the  upper plate is moved with the velocity of 2.5 m/s. | CO1 | 5 |
| 24. | Derive the continuity equation for Cartesian coordinates. | CO1 | 5 |
| 25. | If a liquid has a visocisy of 0.051 poise and kinematic visocity of 0.14 stokes. Calculate its specific gravity. | CO1 | 5 |
| 26. | Calculate the capillary rise in a glass tube of 2.5 mm diameter when immersed vertically in (i) water (ii) mercury. The surface tension = 0.0725 N/m for water and 0.52 N/M for mercury in contact with air. The specific gravity for mercury is given as 13.6 and angle of contact of mercury with glass =1300 | CO2 | 5 |
| 27. | If the velocity distribution over a plate is given by u=2/3y-y2 in which u is the velocity in m/s at a distance of y meter above the plate. Determine the shear stress at y=0 and y=0.15m. | CO1 | 5 |
| 28. | Derive the Euler’s equation of motion and deduce that to Bernoullie’s equation. | CO1 | 5 |
| 29. | i) Distinguish geometric from dynamic similarity.  ii) What is flownet? State its use. | CO2 | 5 |
| 30. | Considering laminar flow through a circular pipe, draw the shear stress and velocity distribution across the pipe section. | CO2 | 5 |
| 31. | Find the head lost due to to friction in a pipe of diameter 300 mm and length  50 m, through which water is flowing at a velocity of 3 m/s using (i) Darcy formula (ii) Chezy’s formula for which C=60. | CO2 | 5 |
| 32. | Find the expression for the power P, developed by a pump when P depends upon the head H, the discharge Q and specific weight w of the fluid. | CO3 | 5 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | |
| 33. | a. | Draw the venturimeter and derive an expression for measurement of discharge through it. | CO1 | 15 |
| b. | A venturimeter having a diameter of 75 mm at the throat and 150 mm diameter at the enlarged end is installed in a horizontal pipline 150 mm in diameter carrying an oil of specific gravity 0.9. The difference of pressure head between the enlarged end and the throat recorded by a U tube is 175 mm of mercury. Determine the discharge through the pipe. Assume the coefficient of discharge of meter as 0.97. | CO1 |
|  |  |  |  |  |
| 34. | a. | Differentiate between open channel flow and pipe flow. Show the energy grade line and the hydraulic grade line in both cases. | CO2 | 15 |
| b. | A concrete-lined Trapezoidal channel (n = 0.015) is to have a side slope of 1.0 Horizontal : 1 Vertical. The bottom slope is to be 0.0004. Find the bottom width of the channel necessary to carry 100 m3/s of discharge at a normal depth of 2.50 m. | CO2 |
|  |  |  |  |  |
| 35. | a. | Explain Buckingham’s theorem. | CO3 | 15 |
| b. | The time period (t) of pendulum depends upon the length(L) of the pendulum and acceleration due to gravity(g). Derive an expression for time period. | CO3 |