

GANPAT UNIVERSITY

B. TECH SEM. 4TH CIVIL ENGINEERING
REGULAR EXAMINATION MAY/JUNE-2012

2CI405 FLUID MECHANICS-II

TIME: 3 HOURS

TOTAL MARKS: 70

- INSTRUCTION:
- 1 Answer to the two sections must be written in separate answer books
 - 2 Attempt all the question
 - 3 Make a suitable assumptions where necessary
 - 4 Figures to the right indicate full marks

Section-I

- Que.-1
- 1 Derive the Continuity equation $A_1V_1 = A_2V_2$ 6
 - 2 Distinguish between 1) Laminar flows and Turbulent flow 2) Rotational flow and Irrotational flow 6
- OR
- Que.-1
- 1 Write a short note on types of fluid. 6
 - 2 A fluid viscosity of 0.5 poise and Sp.Gravity 1.20 is flowing through a circular pipe of diameter 100 mm. The maximum shear stress at the pipe wall is given as 147.45 N/m^2 . Find 1) The pressure gradient 2) the average velocity and 3) the Raynold number of the flow. 6
- Que.-2
- 1 A smooth pipe 100 mm in diameter and 1000 m long carries water at the rate of $0.0075 \text{ m}^3/\text{s}$. if the kinematic viscosity of water is 0.02 stokes, Calculate 5
- 1) Head lost
 - 2) Wall shearing stress
 - 3) Centre-line velocity
 - 4) Shear stress and velocity at 40 mm from the centre line
 - 5) Thickness of the laminar sub layer.
- 2 Differentiate between Hydordynamically smooth and rough boundary 6
- OR
- Que.-2
- 1 Raynold's experiment. 5
 - 2 A smooth pipe line of 100 mm diameter carries 2.27 m^3 per minute of water at 20°C with kinematic viscosity of 0.0098 stokes. Calculate the friction factor, maximum velocity as well as shear stress at the boundary. 6
- Que.-3
- 1 Prandtl's Universal Velocity distribution equation. 6
 - 2 Explain the term 1) Shear velocity 2) Co-efficient of friction 3) Buoyancy force 4) Head loss 5) Free vortex and force vortex 6) Hydraulic jump. 6

Section-II

Que.-4

- 1 Explain what boundary layer theory is? 6
- 2 Derive the expression for momentum thickness. 6

OR

Que.-4

- 1 Write a short note on model analysis. 6
- 2 List down and explain similitude between model and prototype. 6

Que.-5

- 1 The time period (t) of a pendulum depends upon the length (L) of the pendulum and acceleration due to gravity (g). Derive an expression for the time period. 5

- 2 Water is flowing through a pipe of diameter 30 cm at a velocity of 4 m/s. Find the velocity of oil flowing in another pipe of diameter 10 cm, if the condition of dynamic similarity is satisfied between the two pipes. The viscosity of water and oil is given as 0.01 poise and 0.025 poise. The specific gravity of oil = 0.8. 6

OR

Que.-5

- 1 List down and define types of channel. 5
- 2 Prove that rectangular channel will be most economical when width is two times depth of flow. 6

Que.-6

- 1 Find the velocity of flow and rate of flow through a rectangular channel of 6 m wide deep, when it is running full. The channel is having bed slope as 1 in 2000. Take chezy's constant = 55. 6

- 2 Find the bed slope of trapezoidal channel of bed width 4 m, depth of water 3 m and side slope of 2 horizontal to 3 vertical, when the discharge through the channel is $20 \text{ m}^3/\text{s}$. Take manning's $N = 0.03$ in manning's formula. $C = (1/N)^{1/6}$. 6

END OF PAPER