

New

Date: 15/05/2017.

Student Exam No. _____

GANPAT UNIVERSITY
B.Tech.(Civil) Sem-IV
CBCS Regular Theory Examination – April-June-2017
2CI 405 Fluid Mechanics-II

Time: 3 Hours

Total Marks: 60

- Instruction:**
- 1 Answer to the two sections must be written in separate answer books.
 - 2 Assume suitable data if required.
 - 3 Figures to the right indicate full marks

Section-I

- Q-1(a)** Define 'Viscosity'. State the different viscosity meters for the measurement of viscosity. Draw sketch of 'Falling sphere viscometer'. 5
- Q-1(b)** Describe 'Reynold's experiment with a neat sketch showing details. State the inferences drawn. 5

OR

- Q-1(a)** Prove that in laminar flow through a circular pipe, velocity distribution is parabolic. 5
- Q-1(b)** An oil of viscosity 9 poise and sp. Gravity 0.9 is flowing through a horizontal pipe of 60 cm dia. If the pressure drop in 100 m length is 1800 kN/m^2 ,
Determine:-
[i] The rate of flow of oil
[ii] The centre-line velocity 5
- Q-2(a)** Define and differentiate 'Open Channel flow' and 'Flow through Pipe'. 5
- Q-2(b)** What is 'Hydraulic Jump'? State the assumptions made in the analysis of 'Hydraulic Jump'. 5

OR

- Q-2(a)** What is meant by 'Most Economical Channel Section'? Derive the conditions for the most economical section for the Rectangular channel. 5
- Q-2(b)** A trapezoidal channel has side slopes of 3 horizontal to 4 vertical and bed slope is 1 in 2000. Determine the optimum dimensions of the channel if it is to carry discharge of $0.5 \text{ m}^3/\text{s}$. Take Chezy's constant C as 50. 5
- Q-3** Attempt any two: 10
- (1) Applications of 'hydraulic Jump'.
 - (2) Define 'Specific Energy' and draw a typical Specific Energy Curve'
 - (3) Water is to be supplied to the inhabitants of a college campus through a supply main. The following data is given:
[i] Distance of the reservoir from the campus=4000 m
[ii] Number of inhabitants=5000 [iii] Per capita Consumption of water=150 lpd
[iv] Loss of head due to friction=20 m [v] Co-efficient of friction of pipe $f=0.0075$
If the half of the daily supply is pumped in 6 hrs,
Determine the size of the supply main.

Section-II

- Q-4(a) State the methods of describing Fluid motion. Differentiate these methods. 5
- Q-4(b) What is meant by the term 'Dimensional Homogeneity'? Describe the Rayleigh's method for dimensional analysis. 5

OR

- Q-4(a) Define 'laminar' and turbulent flow'. Differentiate the characteristics of Laminar and Turbulent flow. 5
- Q-4(b) State & explain Buckingham's π - theorem. 5
- Q-5(a) Define following: 5
[i] Stream line [ii] Stream Tube [iii] streak line [iv] Velocity potential
[v] Stream function
- Q-5(b) The velocity components in a fluid flow are given by: 5
$$u = 2xy; v = a^2 + x^2 - y^2$$

[i] Show that the flow is possible
[ii] Derive the relative stream function

OR

- Q-5(a) Using Buckingham's π -theorem, show that the velocity through a circular orifice is given by: $V = \sqrt{2gH} \phi \left[\frac{D}{H}, \frac{\mu}{\rho v H} \right]$; where, H=head causing flow, D=Dia of Orifice, μ = Co-efficient of viscosity, ρ = mass density and g= gravitational acceleration 5
- Q-5(b) Derive the expression [Darcy-Weisbach equation] for loss of head due to friction in pipe flow. 5
- Q-6 Write a short note on [Any Two]: 10
- (1) Methods of controlling the Boundary Layer separation
 - (2) Uses and limitations of 'Flownet'
 - (3) Assumptions made in deriving 'Bernoulli's equation'.

END OF PAPER