BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – B.Tech.(ME)-2023
Course Name – Fluid Mechanics
Course Code - PCC-ME303
(Semester III)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Choose the right answer - The velocity at which the laminar flow stops, is known as
a) velocity of approach b) lower critical velocity
c) higher critical velocity d) none of these

(ii) Select of the value of flow behaviour index, does the consistency index has a dimension independent of time.
a) 0 b) 1
c) 2 d) 3

(iii) Choose the proper answer - The property of a liquid which offers resistance to the movement of one layer of liquid over another adjacent of liquid is called
a) surface tension b) compressibility
c) capillarity d) viscosity

(iv) Predict the right answer - Falling drops of water become sphere due to the property of
a) surface tension of water b) compressibility of water
c) capillarity of water d) viscosity of water

(v) Choose the right answer - A jet strikes a curved plate at its _____
a) Sides b) Surface
c) Centre d) Does not strike

(vi) Identify among the following that is the Manning's equation.
a) Q = A/v b) Q = vA
c) Q = v+A d) Q = v-A

(vii) Predict among the following that is an assumption of Hagen-Poiseuille equation.
a) Fluid is uniform b) Fluid is laminar
c) Fluid is turbulent d) Fluid is compressible

(viii) Surface tension has the unit of. Predict the right answer.
a) force per unit area b) force per unit length
c) force per unit volume d) force

(ix) Relate the proper answer - The motion of the fluid is described by _____ method.

a) Lagrangian method
b) Eulerian method
c) Both lagrangian method and eulerian method
d) None of the above

(x) Relate the proper answer - The flowing fluid in a pipe at a constant rate of discharge is example of _____

a) Steady flow
b) Unsteady flow
c) Uniform flow
d) Non uniform flow

(xi) Identify the turbine which is not associated with Draft tube.

a) Francis
b) Reaction
c) Kaplan
d) Pelton

(xii) The head of the Kaplan ranges from _____ . Identify the correct answer.

a) 100 to 200 m
b) 250 to 300 m
c) 10 to 70 m
d) 0 m

(xiii) Identify the instrument used for the automatic control scheme during the fluid flow.

a) Rotameters
b) Pulley plates
c) Rotary Piston
d) Pilot Static Tube

(xiv) Choose the correct answer - Ratio of inertia force to elastic force is known as

a) Mach number
b) Froude number
c) Reynolds number
d) Weber's number

(xv) Predict the right answer - Ratio of inertia force to surface tension is known as

a) Mach number
b) Froude number
c) Reynolds's number
d) Weber's number

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Describe about a Pitot tube to measure fluid velocity. (3)
3. Define the Weber number and discuss its role in assessing the influence of surface tension on fluid flow in pipes and bends. (3)
4. Calculate the density, specific weight and weight of one litter of petrol of specific gravity = 0.7. (3)
5. If the pressure difference between the inside and outside of the air bubble of diameter 0.01 mm is 29.2 KPa. Determine the surface tension at air-water interface. (3)
6. Define manometer. classify them. (3)

OR

Classify fluids and define each type of fluid by giving an example. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Discuss the relationship between the stream function and vorticity in fluid dynamics. (5)
8. Briefly explain about velocity potential function and stream function and its relations. (5)
9. Show that the energy transmitted by a long pipe is maximum when 1/3 rd of energy put into the pipes is lost in friction (5)
10. Explain Lagrangian and Eulerian methods of describing fluid flow. (5)
11. Evaluate an expression for pressure coefficient for flow over a cylinder. (5)

12. The water is flowing through a taper pipe of length 100 m having diameter 600 mm at the upper end and 300 mm at the lower end, At the rate of 50 lit/sec. The pipe has a slope of 1 in 30. Calculate the pressure at the lower end if the pressure at the higher level is 19.62 N/m2. (5)

OR

Explain how the stream function is related to the concept of irrotational flow (5)

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