BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – Dip.ME-2022/Dip.ME-2023
Course Name – Fluid Mechanics & Machinery
Course Code - DMEPC402
(Semester IV)

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 method which exclusively used in fluid mechanics.

  a) Lagrangian method.   b) Eulerian method.

  c) Both Lagrangian and Eulerian methods.   d) Neither Lagrangian nor Eulerian method.

(ii) Select the condition of the intensity of pressure at any point.

  a) Directly proportional to the area of the vessel containing liquid.   b) Directly proportional to the depth of liquid from the surface.

  c) directly proportional to the length of the vessel containing liquid.   d) inversely proportional to the depth of liquid from the surface.

(iii) Identify the dimension of pressure.

  a) $[MLT2]$.   b) $[MLT-2]$.

  c) $[ML-1T2]$.   d) $[ML-1T-2]$.

(iv) Converging-diverging nozzle is also describe as _____

  a) Pascal nozzle.   b) Bernouille's nozzle.

  c) Toricelli's nozzle.   d) De Laval' nozzle.

(v) Identify the total loss developed in a series of pipes.

  a) Sum of losses in each pipe only.   b) Sum of local losses only.

  c) Sum of local losses plus the losses in each pipe.   d) Zero

(vi) Select the appropriate one related to coefficient of friction for laminar flow.

  a) Re/16.   b) Re/64.

  c) 16/Re.   d) 64/Re.

(vii) Identify the power plant in which a water hammer has been developed.

  a) Solar   b) Nuclear

  c) Hydro   d) Wind

(viii) Identify the nature of viscosity of a fluid which is laminar in nature

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a) The viscosity of the fluid should be as low as possible, for laminar flow.

b) The viscosity of the fluid should be as high as possible, for laminar flow.

c) Change in viscosity of the flowing fluid does not affect its flow.

d) Unpredictable.

(ix) Identify the physical property of a fluid whose unit is 'Poise'.

a) Density

b) Kinematic viscosity

c) Viscosity

d) Velocity gradient

(x) Identify one of the following component which is not a part of a turbojet.

a) Compressor

b) Combustion chamber

c) Gas turbine

d) Air filter

(xi) Identify the ratio of the water power to the shaft power.

a) Mechanical efficiency.

b) Volumetric efficiency.

c) Manometric efficiency.

d) Overall efficiency.

(xii) Identify the appropriate condition due to which the droplet of mercury retain the spherical shape.

a) High density.

b) High surface tension.

c) High adhesion.

d) Low vapor pressure.

(xiii) Identify the correct option related to the cavitation in a hydraulic machine.

a) causes noise and vibration of various parts.

b) reduces the discharge of a turbine.

c) causes sudden drop in power output and efficiency.

d) all of these.

(xiv) Select the correct reason for which the intensity of pressure develops at a point in a fluid is the same in the directions

a) the fluid is frictionless and incompressible.

b) the fluid is frictionless.

c) there is no motion of one fluid layer relative to an adjacent layer.

d) the fluid has zero viscosity and is at rest.

(xv) Identify the appropriate terminology related to each term of Bernoulli's equation in $(P/\rho g)+(V2/2g) z$ = constant.

a) Energy per unit mass.

b) Energy per unit weight.

c) Energy per unit volume.

d) Line integral of total energy.

Group-B
(Short Answer Type Questions)   3 x 5=15

2. Distinguish between steady flow and unsteady flow.   (3)
3. Explain the features of hydroelectric power plant.   (3)
4. Explain the working principal of a manometer.   (3)
5. Write a short note on Venturimeter.   (3)
6. Explain the concept of cavitation in turbines.   (3)

OR

Differentiate between Centrifugal pump and Reciprocating pump.   (3)

Group-C
(Long Answer Type Questions)   5 x 6=30

7. Calculate the force exerted by a jet of water of diameter 75mm on a stationary flat plate when the jet strikes the plate normally with a velocity of 20m/s.   (5)
8. Discuss atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure.   (5)
9. Explain different types of draft tube used in the reaction turbine.   (5)
10. Calculate the specific weight, density and specific gravity of one litre of a liquid that weighs 7N.   (5)
11. Write a short note on Francis Turbine with neat sketch.   (5)
12. Explain the working principle of reciprocating pump.   (5)

OR

A centrifugal pump running at 1200 rpm works against a total head of 90 m. The external (5) and internal diameters of the impeller are 600 mm and 300 mm respectively. The width at outlet is 50 mm The velocity of flow through the impeller is constant at 4 m/s. If the blade angle at outlet is 30°, calculate (a) vane angle at inlet, (b) work done by the impeller and (c) manometric efficiency

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