



BRAINWARE UNIVERSITY

Term End Examination 2025-2026

Programme – Dip.CE-2024

Course Name – Hydraulics

Course Code - DCE40111

(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 correct statement from the following.
 - a) An ideal fluid is incompressible
 - b) An ideal fluid is compressible
 - c) An ideal fluid is incompressible and non-viscous
 - d) An ideal fluid has negligible surface tension
- (ii) Select the proper option suitable for a Newtonian fluid.
 - a) Shear stress is proportional to shear strain
 - b) Shear stress is proportional to rate of shear strain
 - c) Rate of shear stress is proportional to shear strain
 - d) Rate of shear stress is proportional to rate of shear strain
- (iii) Identify the physical quantity from the following for which 'Poise' use as a unit.
 - a) Density
 - b) Kinematic viscosity
 - c) Viscosity
 - d) Velocity gradient
- (iv) Identify the condition when the intensity of pressure 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
- (v) Select the correct pressure measuring instrument suitable for high-precision measurements in a laboratory setting.
 - a) Manometer
 - b) Piezoelectric sensor
 - c) Bourdon tube gauge
 - d) Diaphragm pressure gauge
- (vi) A tank is filled with water to a height of 5 meters. Determine the hydrostatic pressure at the bottom of the tank. (Given: Density of water = 1000 kg/m³, g = 9.81m/s²)
 - a) 4905Pa
 - b) 49050Pa

- c) 9810Pa
d) 98100Pa

(vii) Select the situation of flow during the opening of a valve in a pipeline.

a) It stays steady
b) It stays unsteady
c) It stays uniform
d) It stays laminar

(viii) Select from the following instrument that is used to measure flow by application of Bernoulli's theorem.

a) Venturimeter
b) Orificemeter
c) Pitot tube
d) all of these

(ix) Select the factors that does not affect the rate of discharge of a fluid through a pipe from the following.

a) Diameter of the pipe
b) Viscosity of the fluid
c) Length of the pipe
d) Density of the fluid

(x) For maximum transmission of power through a pipeline with total head H identify the amount of head lost due to friction from the following.

a) $H/2$
b) $H/3$
c) $2H/3$
d) $H/4$

(xi) A sudden expansion in a pipe causes a minor loss. Select the process to mitigate this loss in a design.

a) By increasing pipe roughness
b) By reducing the angle of the expansion
c) By increasing the flow velocity
d) By using flexible pipes

(xii) In a rectangular channel, select the ratio of depth to width.

a) Always 1:1
b) Fixed for all flow rates
c) Variable depending on flow conditions
d) Not relevant for open channel flow

(xiii) Select the type of flow scenario where it is expect to observe a hydraulic jump.

a) High velocity, narrow channel
b) Low velocity, wide channel
c) Low velocity, narrow channel
d) High velocity, wide channel

(xiv) Name the part of a centrifugal pump, responsible for converting mechanical energy from the motor into kinetic energy in the fluid.

a) Diffuser
b) Impeller
c) Casing
d) Volute

(xv) In a centrifugal pump, select the factor primarily determines the maximum achievable head.

a) Impeller diameter
b) Rotational speed
c) Fluid density
d) No of impeller vanes

Group-B

(Short Answer Type Questions)

$$3 \times 5 = 15$$

2. Describe the significance of pump efficiency in the context of energy consumption and cost-effectiveness. (3)
3. Write about the Pascal's law. (3)
4. Explain the working principle of differential manometer. (3)
5. Describe about Venturi meter. (3)
6. Evaluate the primary function of centrifugal pump. (3)

OR

Summarises the role of suction and delivery valves in a reciprocating pump. (3)

Group-C

(Long Answer Type Questions)

 $5 \times 6 = 30$

7. Derive the discharge formula for a Triangular Notch (V-Notch). (5)

8. Describe the significance of hydrostatic pressure in the context of hydraulic system. (5)
9. Explain the construction and working principle of a Pitot Tube. (5)
10. State the details of different types of fluids. (5)
11. A horizontal pipe of diameter 30 cm carrying water is abruptly reduced to a diameter of 20 cm. If the discharge through the pipe is 40 litres/s, find the loss of head due to contraction. (5)
Also calculate the pressure loss across the contraction. Assume the coefficient of contraction as 0.62.
12. Evaluate that the concept of net positive suction head (NPSH) affect a centrifugal pump performance. (5)

OR

- Summarize about a reciprocating pump and explain its primary function. (5)
