BRAINWARE UNIVERSITY

Term End Examination 2023-2024
Programme – Dip.ME-2022
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) Compare the unit of specific gravity with the density of liquid.

a) The same unit as that of mass density. b) The same unit as that of weight density.
c) The same unit as that of specific volume. d) No unit.

(ii) Select the parameter which depends upon the variation in volume of a liquid with the variation of pressure.

a) surface tension. b) compressibility.
c) capillarity. d) viscosity.

(iii) Mercury does not wet the glass. Determine the property of the liquid.

a) cohesion. b) adhesion.
c) viscosity. d) surface tension.

(iv) Identify the physical parameter which is measured using a differential manometer.

a) atmospheric pressure. b) Pressure in channels.
c) Pressure in venturimeter. d) Difference of pressures between two points in a pipe.

(v) Identify the physical quantity which generates due to conversion of mechanical energy within the pump.

a) pressure energy. b) kinetic energy.
c) either pressure energy or kinetic energy. d) pressure energy, kinetic energy or both.

(vi) Identify the liquid property which should be the primary and optimum property of a manometric fluid.

a) Low density. b) High viscosity.
c) Low surface tension. d) High surface tension.

(vii) In fluid dynamics, the velocity of the fluid in the stagnation point can be estimated as

a) Zero b) infinite
c) non-existent d) negative

(viii) Determine the property of fluid accounts for the major losses in pipes.

a) Density
b) Specific gravity
c) Viscosity
d) Compressibility

(ix) Recognize the prime factors which regulates nature of fluid flow (laminar and turbulent) within a circular pipe.

a) Prandtl Number.
b) Pressure gradient along the length of the pipe.
c) Dynamic viscosity.
d) Reynolds Number.

(x) Reynolds number can be defined as _____

a) Ratio of pressures in the inlet to the outlet of a pipe.
b) Product of velocity of the flow and the diameter of the pipe, divided by the kinematic viscosity of fluid.
c) Product of the density of the fluid, the velocity of the flow and the diameter of the pipe, divided by the dynamic viscosity of the fluid.
d) Ratio of inertia force to viscous force.

(xi) Interpret the process of filling the liquid into the suction pipe and the pump casing up to the level of the delivery valve.

a) filling
b) pumping
c) priming
d) levelling

(xii) To produce a high head by multistage centrifugal pumps, identify the connection of impellers.

a) Parallel
b) Series
c) Both parallel and series
d) None of these.

(xiii) If two pumps, identical in all respects and each capable of delivering a discharge Q against a head H are connected in series, recognize the resulting discharge

a) Q against a head 2H.
b) 2Q against a head H.
c) 2Q against a head 2H.
d) Q against a head H.

(xiv) Identify the nature of a Reciprocating pump.

a) Negative displacement pump.
b) Positive displacement pump.
c) Diaphragm pump.
d) Emulsion pump.

(xv) In an isothermal atmosphere, we have to predict the pressure, which

a) remains constant.
b) decreases linearly with elevation.
c) increases exponentially with elevation.
d) varies in the same way as the density.

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Distinguish between ideal fluid and real fluid. (3)
3. State the Bernoulli's theorem. (3)
4. Compute the expression: Cd= Cv x Cc. (3)
5. Explain the Newton's law of viscosity. (3)
6. Explain the causes of minor energy losses in flow through pipes. (3)

OR

Discriminate the assumptions about the classification of centrifugal pump. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. A single acting reciprocating pump operating at 60 rpm has a piston diameter of 200 mm and stroke of 300 mm. The suction and delivery heads are 4 m and 20 m, respectively. If the efficiency of both suction and delivery strokes is 75 per cent, measure the power required by the pump. (5)

8. Define total pressure and center of pressure. (5)
9. Deduce the equation of force exerted by jet on fixed vertical plate. (5)
10. Establish a relationship between atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure. (5)
11. Describe with a neat sketch how the difference of pressure at two points of a pipe can be measured with the help of a differential manometer and derive the required equation. (5)
12. Write a note on Kaplan Turbine with neat diagram (5)

OR

A Kaplan turbine operating under a head of 10 m develops 8000 kW. The overall efficiency is 85% and the boss diameter is 0.4 times the diameter of the runner. Calculate the diameter of the runner and speed of the runner. Assume speed ratio as 1.8 and flow ratio as 0.6. (5)

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