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4481**BOARD DIPLOMA EXAMINATION, (C-14)****MARCH /APRIL-2019****DME - FOURTH SEMESTER EXAMINATION****FLUID MECHANICS & HYDRAULIC MACHINERY**

Time: 3 Hours]

[Max. Marks : 80

PART -A**3x10=30M****Instructions:** 1) Answer **all** the questions. Each question carries **Three** marks.

2) Answers should be brief and straight to the point and shall not exceed five simple sentences.

- 1) Define (a) Incompressible fluid (b) Compressibility.
- 2) Calculate the density and weight of one litre of petrol of specific gravity 0.7.
- 3) Write any three differences between laminar from turbulent flows.
- 4) Define coefficient of contraction (C_c) for the folw through orifice.
- 5) Represent the hydraulic gradient line and total energy line for flow of liquid in a pipe graphically.
- 6) What is Syphone and state its function.
- 7) Write the expression for normal force exerted by the jet on stationary inclined flat plate.
- 8) State the function of following parts of pelton wheel turbine
(a) Runner (b) Casing.
- 9) Write the classification of hydraulic turbines according to the direction of flow of water in the runner.
- 10) State the uses of Air vessel in reciprocating pumps.

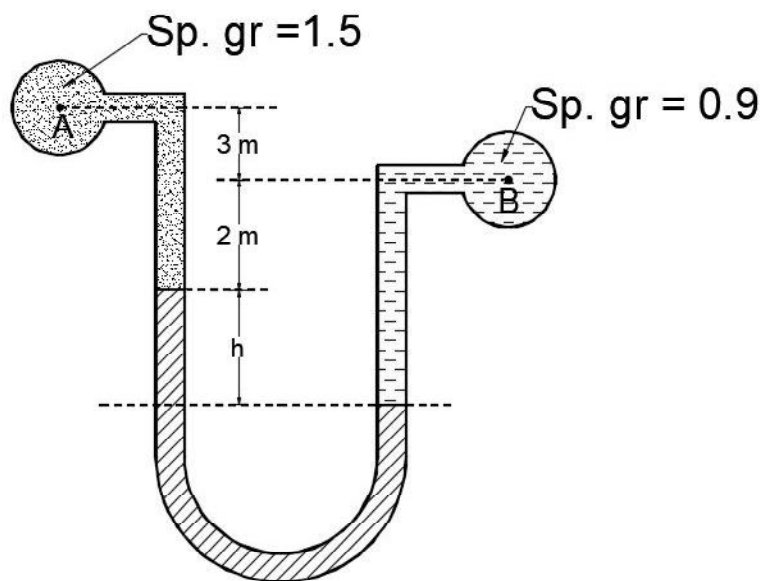
Instructions: 1) Answer any **five** questions.

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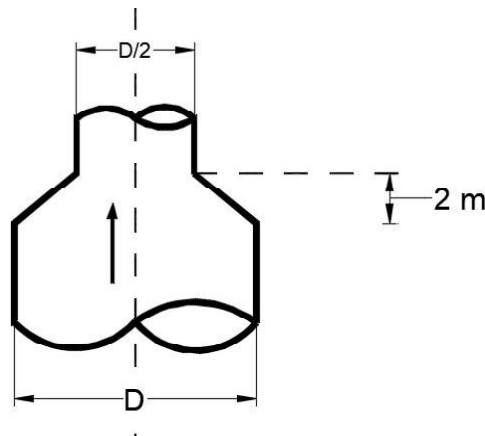
2) Each question carries **ten** marks.

3) Answers should be comprehensive and the criterion for valuation is the content but not the length of answer.

- 11) A differential manometer is connected at two points A and B of two pipes as shown in the fig. 1. The pipe A contains a liquid of Specific gravity 1.5, While pipe B contains a liquid of specific gravity 0.9. The pressures at A and B are $9.81 \times 10^4 \text{ N/m}^2$ and $17.66 \times 10^4 \text{ N/m}^2$ respectively. Find the difference in mercury level (h) in the differential manometer.



- 12) Water flows through a vertical contraction from a pipe of diameter 'd' to another pipe of diameter 'd/2' as shown in fig.2. The water velocity at inlet to contraction is 2 m/s and pressure is 200 KN/m². If the height of contraction is 2 m. Find the pressure at the exit of contraction.



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- 13) Find the power transmitted through hydraulic pipe 1 Km long and 150 mm diameter discharging $0.1\text{m}^3/\text{s}$ of water. The pressure at the supply end (power station) is 6 N/mm^2 and coefficient of friction, $f= 0.0075$. Find also efficiency of transmission.
- 14) A jet of water of diameter 10 cm strikes a flat plate normally with a velocity of 15 m/s. The plate is moving with a velocity of 6 m/s in the direction of the jet and away from the jet. Find
- (a) Force exerted by the jet on the plate. 4+3+3=10M
 (b) Work done by the jet on the plate per second.
 (c) Efficiency of the jet.
- 15) (a) Derive an expression for the normal force and work done by jet on a inclined plate moving in the direction of jet. 5M
 (b) What is a draft tube? Why it is used in a reaction turbine? 5M
- 16) Explain the construction details and working of Francis Turbine with a neat sketch.
- 17) A double acting single cylinder reciprocating pump has the following specifications: 4+3+3=10M
 Cylinder diameter = 200mm, Stroke = 300mm,
 Gross height to which water is lifted = 20m,
 Speed = 40 rpm
 Determine :
 (a) Theoretical Discharge
 (b) Theoretical power required to drive the pump
 (c) Coefficient of discharge and Slip, if the actual discharge is 12litres/sec.
- 18) Explain the working of submersible pump with a neat sketch. Write the applications. 6+4=10M

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