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C14–M–405

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BOARD DIPLOMA EXAMINATION, (C–14)

OCT/NOV—2018

DME—FOURTH SEMESTER EXAMINATION

FLUID MECHANICS & HYDRAULIC MACHINERY

Time : 3 hours] [*Total Marks* : 80

PART—A 3×10=30

Instructions : (1) Answer **all** questions.
(2) Each question carries **three** marks.
(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Define the following :

(a) Weight Density

(b) Specific Gravity

2. Define buoyancy and buoyant force.

3. State the reason for high Energy losses in turbulent flow.

4. State Bernoulli's theorem.

5. What are the factors responsible for loss of head during flow through pipes.

6. Define the following :

(a) Hydraulic Gradient line

(b) Total energy line

7. A jet of water 20mm diameter discharging 30 litres/sec strikes normally on a fixed flat vertical plate. Determine the force exerted on the plate.

8. State three differences between Impulse and reaction turbines.

9. State the function of the following parts of Pelton wheel turbine (a) Runner, (b) Breaking jet.

10. What is the purpose of priming in a Centrifugal pump.

PART–B

10×5=50

Instructions : (1) Answer *any* **five** questions.
(2) Each questions carries **ten** marks.
(3) Answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

11. (a) Explain the working principle of Bourdon pressure gauge with a neat sketch.

(b) The pressure of water in a pipe line was measured by a simple manometer containing mercury as shown in fig 1. Determine the pressure of water in the pipe in terms of KPa.

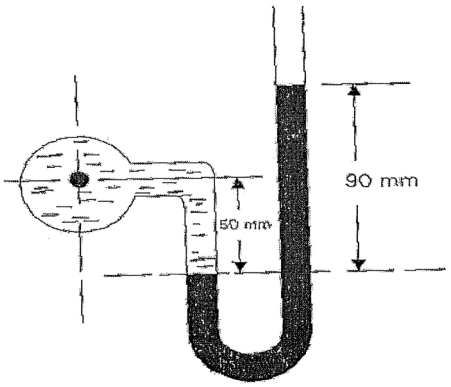

Fig. 1

12. A venturimeter has an area ratio (inlet of the venturimeter to throat) 9 to 1, larger diameter is 300mm. During the flow, the recorded pressure head in the larger section is 6.5m and that at the throat 4.25m. If the coefficient of discharge, C_d is 0.99. Find the discharge through the venturimeter.

13. The difference in water surface in two reservoirs A and B is 10m and gauge pressure of air space in A is 50 kN/m^2. They are connected by a single pipe 250m long and 200mm in diameter as shown in the fig. 2. If the friction factor(f) is 0.08, Calculate the discharge.

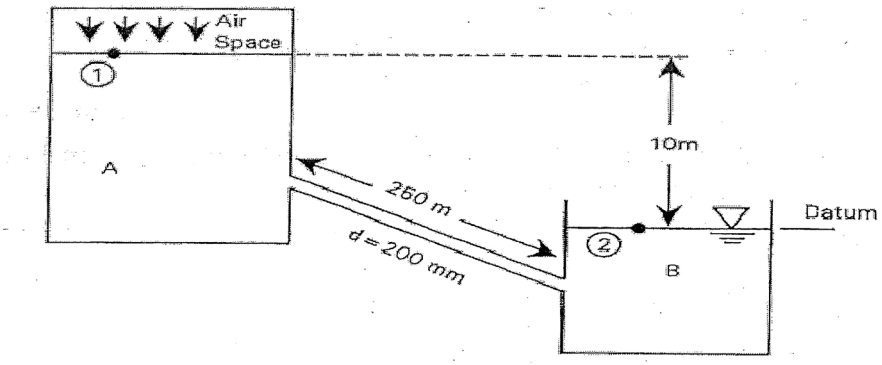

Fig. 2

14. A jet of water of diameter 7.5cm strikes a symmetrical curved plate at its centre with a velocity of 20 m/s. The curvedplate is moving with a velocity of 8 m/s in the direction of jet. The jet is deflected through an angle of 165^0. Find

(a) Force exerted by the jet on the plate in the direction of jet

(b) Power of the jet

(c) Efficiency of the jet

15. (a) Drive an expression for the normal force and work done by the jet on a flat moving plate.

(b) Draw the line diagram of a hydro electric power station and label its main elements.

16. A kaplan turbine runner has an outer diameter of 4.5m and an inner diameter of 2.5m developes kW when running at 140rpm under a head of 20m. The hydraulic effciency is 94% and overall efficiency is 80%. Find the discharge through the turbine, and the guide blade angle at inlet.

17. A singal cylinder, single acting reciprocating pump has the following specifications.

Plunger diameter = 500mm Stroke = 300mm

Static lift = 12m Speed = 60rpm

Discharge = 3357 liters/min

determine (a) Coefficient of discharge (b) Slip

(c) Power required to drive the pump, if its efficiency is 85%.

18. Explain the working of Submersible Pump with neat sketch. write the application of submersible Pump.