



C09-M-406

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**BOARD DIPLOMA EXAMINATION, (C-09)
OCT/NOV—2016
DME—FOURTH SEMESTER EXAMINATION
HYDRAULICS AND FLUID POWER SYSTEMS**

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 properties and state their units : $1\frac{1}{2}+1\frac{1}{2}$
 - (a) Mass density
 - (b) Specific weight
2. Differentiate between laminar flow and turbulent flow.
3. What is a syphon system and what are the limitations encountered in flow through the syphon?
4. Derive the expression for the force exerted by the jet when it strikes at the centre of fixed curved vane.
5. In a turbine the relative velocity and velocity of flow at inlet are equal and in same direction. Under what conditions this can occur?

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6. A turbine develops 600 kW power. The net head available is 40 m. If the overall efficiency of the turbine is 0.8, what is the discharge through the turbine?
7. What is meant by cavitation and what are the effects of cavitation in pumps?
8. State any six merits of hydraulic control system.
9. Briefly explain the working principle of pneumatically operated toggle clamp.
10. State the advantages of hydro-pneumatic system.

PART—B

10×5=50

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

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

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

11. Explain how pressure is measured at a point in a fluid, flowing through a pipe using—

(a) U-tube manometer;

(b) inverted differential manometer.

5+5

12. A circular pipe of 250 mm diameter carries an oil of specific gravity 0.8 at the rate 120 lit/sec and under a pressure of 2 kPa. Calculate the total energy in meters at a point which is 3 m above datum line.

13. What is supplied from a reservoir through a 300 mm diameter pipe 600 m long to a turbine which is situated 108 m below the free surface. Discharge through the pipe is 81 lit/sec. Find the head lost and the power transmitted by the pipe. Darcy's factor $f = 0.01$.

14. A jet of 78.54 cm^2 area, moving with a velocity of 12 m/s impinges on a series of vanes moving with a velocity of 8 m/s. Determine—
- (a) force on the plate;
 - (b) work done per second;
 - (c) efficiency.
15. A Pelton wheel develops 100000 kW under a head of 7450 m. when running at 300 r.p.m. It has two jets. Find the dia of jet and wheel and also find the discharge. Assume $C_v = 0.98$, speed ratio = 0.46. Jet diameter is not to exceed one-sixth of the wheel dia.
16. The impeller of a centrifugal pump has outer diameter of 40 cm and inner diameter of 20 cm. The blade angle at outlet is 30° . The speed of the impeller is 1450 r.p.m. The velocity of flow at inlet and outlet is same at 2.2 m/s. If the manometric efficiency is 75%, find—
- (a) the head developed;
 - (b) absolute velocity at outlet;
 - (c) blade angle at inlet.
17. Draw a neat sketch of a hydraulic crane and explain its working.
18. Draw and explain a pneumatic safety circuit for protection against overload.
