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C16–M–402

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## BOARD DIPLOMA EXAMINATION, (C–16)

## SEPTEMBER/OCTOBER - 2020

## DME—FOURTH SEMESTER EXAMINATION

HYDRAULICS AND FLUID POWER CONTROL 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 terms :

*(a)* Viscosity

*(b)* Surface tension

**2.** Define the following :

*(a)* Steady flow

*(b)* Non-uniform flow

**3.** Define the following :

*(a)* Hydraulic Gradient Line (HGL)

*(b)* Total Energy Line (TEL)

4. Obtain the expression for the force exerted by the jet on an inclined plate in the direction normal to the plate.

5. Draw the layout of a hydroelectric power station and label it.

6. What is cavitation? Write its effect in hydraulic pumps.

7. Give any three industrial applications of fluid power.

8. Draw the hydraulic circuit indicating the basic components.

9. State the disadvantages of pneumatic system.

10. State the purpose of seals and give their classification.

## PART—B

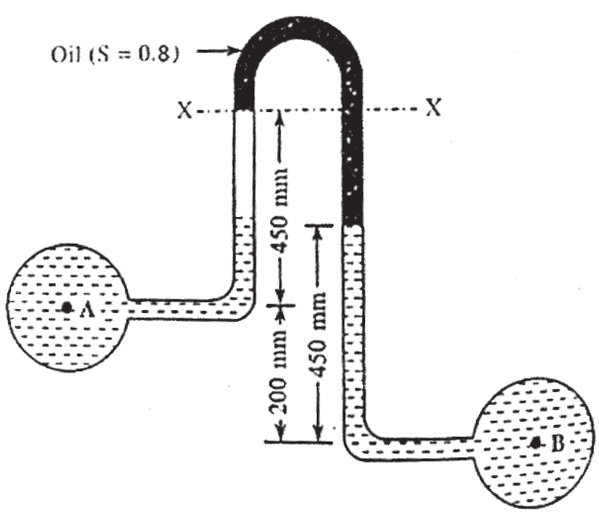
10×5=50

***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. An inverted differential manometer is connected to two pipes A and B carrying water as shown in the figure below. The fluid in the manometer is oil of specific gravity 0·8. Determine the pressure difference between A and B :



**12.** The water is flowing through a pipe having diameters 25 cm and 15 cm at sections *A* and *B* respectively. The rate of flow through the pipe is 40 litres/s. The section *A* is 700 cm above the datum and the section *B* is 400 cm above the datum. If the intensity of pressure at section *A* is 385 kPa, find the intensity of pressure at section *B* in Mpa.

**13.** A compound piping system consists of 1600 m length of 0·5 m diameter, 1400 m length of 0·4 m diameter and 800 m length of 0·2 m diameter pipes connected in series. Take *f* same for all the pipes.

*(a)* Determine the equivalent length of 0·3 m diameter pipe.

*(b)* Determine the equivalent diameter of 3500 m long pipe.

**14.** A jet of water of diameter 8 cm strikes a flat plate normally with a velocity of 12 m/s. The plate is moving with a velocity of 5 m/s in the direction of the jet and away from the jet. Find the—

*(a)* force exerted by the jet on the plate;

*(b)* work done by the jet on the plate per second;

*(c)* efficiency of the jet.

**15.** Explain the governing of a Pelton wheel with a neat sketch.

**16.** A double-acting reciprocating pump has a piston diameter of 200 mm, piston rod diameter of 50 mm and stroke of 400 mm. It lifts water through a height of 30 m at a speed of 80 r.p.m. The discharge is 45 litres/s. Find the—

*(a)* theoretical discharge;

*(b)* coefficient of discharge;

*(c)* slip;

*(d)* theoretical power required;

*(e)* actual power required, if efficiency is 80%.

**17.** With a neat sketch, explain the working of internal gear pump.

**18.** With a neat sketch of each, explain the following :

*(a)* Control of single-acting cylinder using Pilot control valve

*(b)* Control of single-acting cylinder using shuttle valve

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