

# 17426

16117

**3 Hours / 100 Marks**

Seat No.

--	--	--	--	--	--	--	--

- Instructions* – (1) All Questions are *Compulsory*.
- (2) Answer each next main Question on a new page.
- (3) Illustrate your answers with neat sketches wherever necessary.
- (4) Figures to the right indicate full marks.
- (5) Assume suitable data, if necessary.
- (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
- (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

1. a) **Attempt any SIX of the following:**

**12**

- (i) Write expression for kinematic viscosity.
- (ii) What type of fluid is H<sub>2</sub>O?
- (iii) If  $N_{Re}$  is 1700, what is the type of flow.
- (iv) Write expression to calculate friction factor for laminar flow.
- (v) Define schedule number. What does it indicate?
- (vi) Give specific application of a centrifugal pump.
- (vii) Name an equipment which can be used for producing vacuum without a moving part.

P.T.O.

b) **Attempt any TWO of the following:**

8

- (i) Differentiate average velocity and point velocity on following points:
  - 1) formula which can be used to calculate
  - 2) Variation in the value of same
- (ii) Draw a sketch of a gage valve and name its parts.
- (iii) Differentiate a variable head meter and a variable area meter on the following points:
  - 1) variation in pressure
  - 2) ease of handling
  - 3) cost

2. **Attempt any FOUR of the following:**

16

- a) Derive an expression to calculate pressure at a point in a liquid column whose height from surface of liquid is 'h' cm and density of liquid  $\rho$  gm/cm<sup>3</sup>.
- b) Why it is necessary to calculate friction in a pipe? Does it change with nature of fluid.
- c) What is the ultimate safe devise used in a pressure vessel to avoid accident? Explain its working.
- d) What do you mean by NPSH? Write expression for the same.
- e) Reynolds number is 5000. Calculate the fannings friction factor.
- f) What do you understand by callibration of a flow meter? Draw a callibration curve for a rotameter.

3. **Attempt any FOUR of the following:**

16

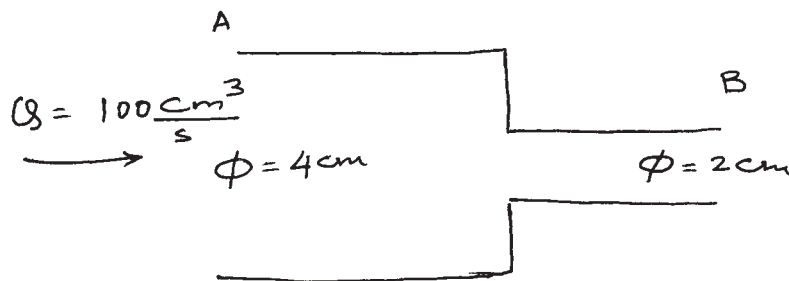
- a) Derive an expression for calculating pressure drop using a U-tube manometer.
- b) Why pressure drop in a globe valve is more than a gate valve?

- c) Differentiate a reciprocating pump and a centrifugal pump on the following points:
- category of which they belong
  - cost
  - pressure developed
  - efficiency
- d) Give the pressure range developed by a blower, fan and a compressor.
- e) What is a Newtonian fluid? Give relation between shear stress and shear strain for this type of fluid.
- f) Draw diagram to relate head developed, efficiency and BHP to volumetric flow rate for a centrifugal pump.

4. Attempt any **FOUR** of the following:

16

- Draw sketch of any two commonly used pipe fittings and their use.
- Name any dimensionless number you have studied and show that it is dimensionless.
- Draw a diagram of a centrifugal compressor.
- Draw a neat diagram of a venturimeter and name its different parts.
- From the following diagram find the velocity at point B. Refer Fig. No. 1



**Fig. No. 1**

- A mercury manometer shows a pressure drop of 1.4 cm. Find out the pressure drop in terms of  $\text{H}_2\text{O}$  column.

**5. Attempt any TWO of the following:****16**

- a) Oil having a sp.6 of 0.8 and an absolute viscosity of 0.08 poise flows through a 12.5 mm dia horizontal pipeline 20 m long with velocity of 50 cm/sec. Find pressure drop between two ends of the pipe.
- b) A liquid is flowing at the rate of 20 lit/s through a 2 cm dia pipe. Density of liquid is 870 kg/m<sup>3</sup>. Calculate:
- (i) mass flow rate in kg/s
  - (ii) volumetric flow rate in m<sup>3</sup>/s
  - (iii) Average velocity in m/s
  - (iv) mass velocity in  $\frac{\text{kg}}{\text{m}^2 \cdot \text{s}}$
- c) A venturimeter is used to measure flow rate of water. Calculate the flow rate in lit/sec if mercury manometer reads 18 cm. The pipe dia is 75 mm while throat dia is 25 mm. Take  $C_v = 0.97$ .

**6. Attempt any TWO of the following:****16**

- a) Draw a neat diagram, name different parts and describe working of a centrifugal pump.
- b) Derive expression to find out velocity of a liquid flowing through an orifice plate fitted in a pipe line.
- c) Draw a neat diagram and explain working of any vacuum producing equipment you have studied.
-