

17426

14115

3 Hours / 100 Marks

Seat No.

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- 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 :

12

- Define kinematic viscosity and write its unit in SI.
- Define Newtonian fluid.
- Draw a sketch of laminar flow and turbulent flow.
- Calculate friction factor when Reynolds No. is 144054.
- What is material of construction for pipes and tubes ? (one point each)
- Give the application of screw pump.
- Write pumping devices for gases.

(B) Attempt any TWO :

08

- Derive equation $\dot{m} = \rho uA$
- Draw the diagram of Globe valve.
- Draw the characteristics curves of Centrifugal pump.



P.T.O.

2. Attempt any FOUR :**16**

- (a) Draw the diagram of Inclined Tube manometer and write equation to calculate pressure drop.
- (b) What is Fanning Friction Factor ? Write units of it.
- (c) Write the equation for calculating the frictional loss due to sudden contraction and explain the terms involved.
- (d) How will you calibrate a given rotameter ?
- (e) Draw the diagram of Rupture disc and explain its construction.
- (f) What is Air Binding and Priming of Centrifugal pump ?

3. Attempt any FOUR :**16**

- (a) Derive the equation $(P_1 - P_2) = h (\rho_m - \rho)g$.
- (b) Give classification of Fluids.
- (c) Differentiate between Diaphragm valve and Ball valve based on :
 - (i) pressure drop
 - (ii) application
- (d) What are the factors which influence the choice of pump ?
- (e) Compare reciprocating compressor and centrifugal compressor on basis of following points.
 - (i) Speed (ii) Rate of flow
- (f) What is meant by NPSH ? Write its equation.

4. Attempt any FOUR :**16**

- (a) An open reservoir contains a liquid having a density of 1250 kg/m^3 . At a certain point in the reservoir, the gauge pressure is 32.424 kN/m^2 .g. What height above the given point is the liquid level ?
- (b) An oil of specific gravity 0.95 is flowing at a rate of 60 lit/sec through a pipeline of 200 mm diameter. Calculate N_{Re} .
- (c) Write the purpose of following fittings.
 - (i) Union (ii) Plug (iii) Cross (iv) Reducer
- (d) Draw a labelled diagram of Venturimeter and write its principle.
- (e) A fluid is flowing through a 5 cm diameter pipe at a velocity of 2 m/sec, that pipe is connected to a larger diameter pipe has diameter 10 cm. Calculate frictional loss due to sudden expansion.
- (f) Compare Blower & Compressors on the basis of
 - (i) Pressure
 - (ii) Application

5. Attempt any TWO :**16**

(a) Toluene is flowing at a rate of 12 lit/sec through a 3 cm diameter pipe. Density of toluene is 870 kg/m³. Calculate –

(i) “Q” in m³/sec.

(ii) \dot{m} in kg/sec

(iii) “u” in m/sec

(iv) “G” in kg/m² sec.

(b) Acetic acid is to be pumped at a rate of 0.02 m³/sec through a 75 mm i.d. pipeline. What is pressure drop in the pipeline over a 70 m length ?

Data : Density of Acetic acid = 1060 kg/m³.

Viscosity of Acetic acid = 0.0025 (N.sec/m²)

(c) Orificemeter is installed in a pipeline for measurement of flow rate of H₂O. Pressure drop across orificemeter is 11 cm of Hg. Calculate volumetric flow rate in m³/sec. Coefficient of orifice is 0.62.

Data : Diameter of orifice = 25 mm

Diameter of pipe = 50 mm

Density of water = 1000 kg/m³

Density of mercury = 13600 kg/m³

6. Attempt any TWO :**16**

(a) Derive the following equation :

$$\frac{P}{\rho} + gz + \frac{u^2}{2} = \text{constant}$$

(b) With the help of a diagram, explain working of double acting reciprocating pump.

(c) Draw a diagram of steam jet ejector. Explain working of steam jet ejector.
