22409

12425 3 Hours / 70 Marks

Seat No.

Instructions :	(1)	All Questions are <i>compulsory</i> .
----------------	-----	---------------------------------------

- (2) Answer each next main Question on a new page.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data, if necessary.
- (5) Use of Non-programmable Electronic Pocket Calculator is permissible.
- (6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

1. Answer any FIVE of the following :

- (a) Name any four types of pumps.
- (b) List out any four flow measuring devices.
- (c) Define Newtonian and Non-Newtonian fluids.
- (d) State one example of each
 - (i) Compressible fluid
 - (ii) Non-compressible fluid
- (e) State significance of Reynold's number.
- (f) Define NPSH.
- (g) Give SI unit of dynamic viscosity and kinematic viscosity.



Marks

2. Answer any THREE of the following :

- (a) Draw a neat sketch of gate valve.
- (b) State Newton's law of viscosity with its mathematical statement.
- (c) State specific use of following pipe fittings :
 - (i) Tee
 - (ii) Elbow
 - (iii) Plug
 - (iv) Bend
- (d) Draw a neat sketch of orifice meter showing the pressure tap connections.

3. Answer any THREE of the following :

- (a) State assumptions for deriving Bernoulli's equation.
- (b) Compare fan and blower on the basis of
 - (i) Speed
 - (ii) Pressure developed
- (c) State and derive equation of continuity.
- (d) Draw and explain characteristics curves of centrifugal pump.

4. Answer any THREE of the following :

- (a) Explain the procedure of calibration of rotameter.
- (b) Define minimum fluidization velocity. Give 2 applications of fluidization.
- (c) Explain construction and working of rupture disc.
- (d) Find the pressure developed due to
 - (i) 0.5 m Hg of specific gravity 13.6
 - (ii) 2 m of oil of specific gravity 0.8
- (e) Explain construction of pitot tube with diagram.

22409

12

12

5. Answer any TWO of the following :

- (a) Describe with sketch working of centrifugal pump.
- (b) Water is flowing through a taper pipe of dia 80 cm at 'A' and 40 cm at 'B'. The rate of discharge of water is 0.07 m³/s. The difference in potential head is 2.5 m. Determine the pressure at 'B'. The pressure at 'A' is 2.75 kgf/cm². Neglect the frictional losses. 'A' is on datum level. Density of water = 1000 kg/m³.
- (c) A venturimeter is installed in pipe of dia. 20 cm carrying oil of specific gravity 0.8. The pressure drop across the throat and upstream of the meter is 30 cm of mercury. The dia. of throat is 10 cm. Calculate volumetric flow rate of oil in m^3 /sec. Take Cd = 0.98 and specific gravity of mercury 13.6.

6. Answer any TWO of the following :

- (a) Explain construction and working of steam jet ejector.
- (b) 1.5 kg/sec of acid is to be pumped through 20 mm dia pipe, 35 m long, to a tank 10 m higher than its reservoir. Calculate the actual power required, if the efficiency of pump is 60%.
 - Data Density of acid = 1180 kg/m^3

Viscosity of acid = 0.016 Ns/m^2

(c) Water is flowing through 25 mm ID pipe at a rate of 1 kg/sec. Calculate pressure drop over the length of 75 m.

Data - f = 0.0001, ρ of water = 1000 kg/m³ μ of water = 8.0 × 10⁻⁴ pa-s.

22409