17426

21718

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.

(8) Use of steam tables, logarithmic, Mollier's chart is permitted.

Marks

1. (A) Attempt any SIX : **12**

(a) State Newton's law of Viscosity.

(b) Write difference between Ideal fluid and Actual fluid. (Four points)

(c) Write significance of Reynold's number.

(d) Write expression for friction losses due to sudden contraction and sudden expansion.

(e) Explain the term equivalent length of pipe.

(f) Why Priming is required in centrifugal pump ?

(g) Write applications of Jet ejectors. (Four points)

(B) Attempt any TWO : **08**

(a) Derive equation of continuity.

(b) Draw neat sketch of the following and label it :

(i) Gate valve

(ii) Diaphram valve

(c) Explain characteristics curves of centrifugal pump.

2. Attempt any FOUR : **16**

(a) A simple U tube manometer is installed across a pipeline. The manometric fluid is mercury (sp. gr. 13.6) and flowing fluid is CTC of sp.gr. 1.6. The difference in the level of manometric fluid is 150 mm and level in right limb is 30 mm above the centre of pipe line. Calculate the pressure in the pipe in N/m^2.

(b) Write Hagen poiseuille's equation and explain the terms involved.

(c) Draw diagram of Rupture disc and write its construction.

(d) Explain briefly, with neat sketches : (i) volute casing (ii) vortex casing.

(e) Write relationship between friction factor and Reynold No. for Laminar and turbulent flow.

(f) Differentiate between venturimeter and orifice meter.

3. Attempt any FOUR : **16**

(a) Derive the equation $\Delta P = h\,(\delta m^{-\delta})g$.

(b) Draw a neat sketch of following pipe fittings and give their specific applications : (i) Plug (ii) Cross.

(c) Explain working of double acting reciprocating pump.

(d) Distinguish between compressor, and fan on the basis of speed, pressure developed, flowrate and efficiency.

(e) State Newtonian fluid and Non-Newtonian fluids. Give examples of both.

(f) Explain the term NPSH also write its equation.

4. Attempt any FOUR : **16**

(a) Differentiate between piping and tubing.

(b) Calculate critical velocity, when water is flowing through 25 cm I.d. pipe. Viscosity of water is 0.0008 Pa.s.

(c) Draw a neat sketch of reciprocating compressor and label it.

(d) Why rotameter is called variable area meter ?

(e) Distinguish between form-friction and skin friction.

(f) Define the following : Atmospheric Pressure and Guage pressure with suitable sketch.

5. Attempt any TWO : **16**

(a) Water is flowing through 25 mm Id pipe at a rate of 1 kg/s. Calculate the pressure drop over a length of 100 metres.

Data – Friction factor f = 0.0001

Density of water = 1000 kg/m^3.

Viscosity of water = 8.0×10^{-4} Pa.s.

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

(i) 'Q' in m^3/s

(ii) Mass flow rate in kg/sec.

(iii) Average velocity in m/s

(iv) Mass velocity in kg/m^2. sec.

(c) Draw neat sketch of Pitot tube and write its construction, working and application.

P.T.O.

6. Attempt any TWO : **16**

(a) Draw diagram of screw pump and write its construction, working and application.

(b) State and derive Bernoulli's equation.

(c) Write principle and working of vacuum pump with a neat sketch.
