22409

23124

3 Hours / 70 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. Attempt any FIVE : **10**

(a) Define ideal and real fluid.

(b) Name the types of friction encountered when a fluid flows through a flow system.

(c) State the assumptions made in the derivation of the Bernoullie's equation.

(d) List any four pipe fittings used in a piping system.

(e) State the difference between a flow regulating valve and throttling valve.

(f) Give classification of pumps.

(g) Define fluidization and give one example.

2. Attempt any THREE : **12**

(a) Explain the concept 'Hydrostatic equilibrium'.

(b) Explain the procedure to calibrate a venturimeter or an orifice meter.

(c) Draw a neat sketch of a Gate valve.

(d) Calculate the NPSH of a centrifugal pump using following data :

(i) Vapour pressure of liquid = 26.66 KPa

(ii) Distance between level of liquid in reservoir and suction line = 1.2 m

(iii) Density of liquid = 1000 kg/m^3

(iv) Friction in suction line = 3.5 J/kg

(v) Reservoir is open to atmosphere.

3. Attempt any THREE : **12**

(a) Define fanning friction factor and state the relationship to determine it in laminar and turbulent flow.

(b) Explain the construction and working of a pitot tube.

(c) Explain the construction, working and application of a Rupture disc.

(d) Draw and explain characteristic curves of a centrifugal pump.

4. Attempt any THREE : **12**

(a) Derive the expression for Newton's law of viscosity.

(b) The pressure difference over a manometer is 2452 N/m^2. The manometric fluid is carbon tetrachloride (Sp. gr. = 1.6) and water is the process fluid. What will be the manometer reading in c.m. ?

(c) Differentiate orifice meter and venturimeter on any six points.

(d) Explain air binding and priming of a centrifugal pump.

(e) Explain the construction and working of a Steam Jet Ejector.

5. Attempt any TWO : **12**

(a) With a neat sketch, explain the construction and procedure of Reynold's experiment. What conclusions are drawn from it ?

(b) Derive the Bernoulli's equation. Name the corrections made to it.

(c) Compare centrifugal and reciprocating pump on any ten points.

6. Attempt any TWO : **12**

(a) Acetic acid is to be pumped at a rate of 0.02 m^3/s through a 75 mm ID pipeline. What pressure drop will occur over a length of 70 m ?

Data : density of Acetic acid = 1060 kg/m^3

viscosity of Acetic acid = 0.0025 Pa.S.

(b) A 15 kW pump with 80% efficiency is discharging oil of specific gravity 0.85 to a overhead tank from a storage tank. The surface of oil in the storage tank from a datum line is 5 m and that in the overhead tank from the datum line is 25 m. Both the tanks are open to atmosphere. If the frictional losses are 1.75 m of flowing fluid, calculate the volumetric flow rate of oil. Draw the flow system diagram also.

(c) Compare centrifugal compressor with reciprocating compressor. Where are they used ?