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21314

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** of the following: **12**
- i) Define partial pressure. Write the unit of pressure in SI.
- ii) Define compressible fluid.
- iii) Define critical velocity.
- iv) Define fanning's friction factor.
- v) Define equivalent length of pipe fittings.
- vi) Give the application of diaphragm pump.
- vii) Give the application of steam jet ejector in chemical industry.

P.T.O.

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

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- i) What is the difference between velocity calculated using a pitot tube and venturimeter. Give the formula to calculate velocity using a pitot tube and venturimeter.
- ii) Draw the diagram of a non return valve fitted on a vertical pipe. Give the application of non return valve. (N.R.V.)
- iii) What is priming of a centrifugal pump? How is it done?

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

16

- a) Draw the diagram of a inclined leg manometer and mark the parts.
- b) Write the Hagen Poiseuille's equation and explain the terms involved in it.
- c) Explain construction and working of rupture disc.
- d) Draw the characteristics curve of centrifugal pump.
- e) What is friction factor chart?
- f) Compare variable head meter and variable area meter based on following points:
 - i) Area of flow
 - ii) Pressure drop
 - iii) Measurement of flow rate
 - iv) Cost.

3. Attempt any FOUR of the following:**16**

- a) Derive the equation for calculating pressure drop using a u-tube manometer.
- b) Draw the diagram of a gate valve and mark the parts.
- c) Give the difference between single acting and double acting reciprocating pumps based on:
 - i) Number of suction stroke and delivery stroke
 - ii) Contact between piston and pumping liquid.
- d) Explain the working of reciprocating compressor.
- e) Define Newtonian and Non Newtonia fluid.
- f) Draw the diagram of a centrifugal pump and mark the parts.

4. Attempt any FOUR of the following:**16**

- a) Draw the diagram of:
 - i) Tee
 - ii) Plug.State its application
- b) Explain Reynolds experiment with the help of a diagram.
- c) Give the range of pressure developed by fan, blower and compressor.
- d) How will you calibrate a given rotameter?
- e) Write the formula to calculate frictional loss due to sudden contraction and explain the terms involved in it.
- f) Calculate the pressure developed by a 8 cm column of:
 - i) Water
 - ii) Liquid of specific gravity 0.9

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

- a) Liquid is to be pumped at a rate of $0.5 \text{ m}^3/\text{s}$ through a 75 mm diameter pipe line for a length of 100 m. Density of the liquid is 1100 kg/m^3 and viscosity is 0.003 Pa.S . Calculate the pressure drop in the pipe.
- b) State and derive equation of continuity. Water is flowing through a 2 cm diameter pipe at a velocity of 8 cm/s . It enters a large pipe of diameter 10 cm. Find the velocity of water in the large diameter pipe.
- c) Derive the equation to calculate volumetric flow rate using a venturimeter.

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

- a) What is cavitation? Give its draw back. Derive the formula to calculate NPSH.
 - b) Sulphuric acid is to be pumped at a rate of 4 kg/s through a 50 mm diameter pipe for a length of 850 m and then raised vertically to a height of 20 m. If the efficiency of the pump is 60%, calculate the power required by the pump.
Density of sulphuric acid - 1650 kg/m^3 .
Viscosity of sulphuric acid - 0.0086 pa.s .
 - c) Explain the working of steam jet ejector.
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