Code No: R07A12301 **R07** **Set No. 2**

I B.Tech Examinations,June 2011
PROCESS ENGINEERING PRINCIPLES
Bio-Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. Enumerate Newtons law of viscosity. Explain the importance of viscosity in fluid motion. What is the effect of temperature on viscosity of water and that of air? [16]

2. (a) Explain the purpose of using a non return valve in the suction pipe of a centrifugal pump.
   (b) Discuss about the important flow meters used in industry. What are the advantages and disadvantages over each other?
   (c) What is the use of foot valve and strainer in centrifugal pump? [6+8+2]

3. (a) 28.8 ml of H_2SO_4 was needed for the complete precipitation of $BaSO_4$ from 100 g of a 15% solution of $BaCl_2$. Find the normality of the H_2SO_4 solution.
   (b) The solubility of potassium chlorate at 70 ^{0}C is 30.2 g and at 30 ^{0}C is 10.1 g in 100g of water. How many grams of potassium chlorate will precipitate from 350 g of a solution saturated at 70 ^{0}C if it is cooled to 30 ^{0}C? [8+8]

4. (a) How are bio-chemical reactions different from chemical reactions?
   (b) Briefly explain the steps in development of a complete bioprocess for commercial manufacture of a new recombinant DNA derived product. [8+8]

5. (a) With a neat sketch explain the working of an air lift pump. Discuss its advantages and disadvantages over centrifugal pump.
   (b) Water is pumped from a ground level reservoir to an overhead tank through a 7.5 cm ID pipe as shown in figure 6b

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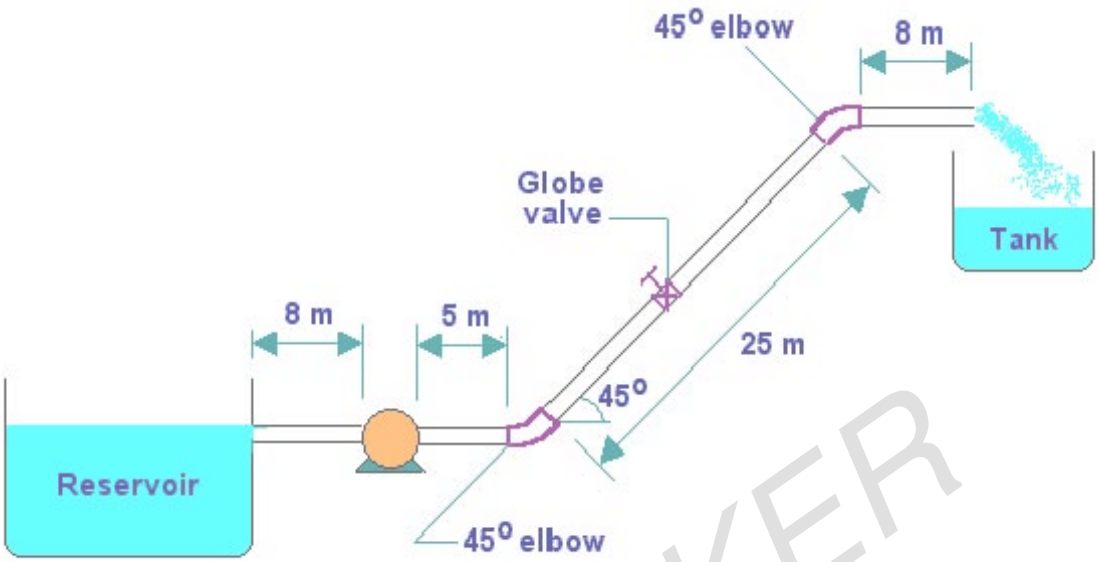

Figure 6b

i. What pressure is needed at the outlet of the pump to supply water to the tank at the rate of 100 ltr/min?

ii. What is the power required for the pump, if the pump is only 60% efficient?

Data:
$\mu = 1$ cP; $\rho = 1$ g/ml.
Equivalent length of fittings (L_e/D):
Globe valve (open) : 300
45^o elbow : 15
Fanning friction factor for turbulent flow is given by: f = 0.079 $(NR_e)^{-0.25}$.
[8+8]

6. (a) Calculate the power required and the pressure which should be developed by a pump of efficiency 80% to pump 60 liters/ min. of 98% sulfuric acid at 25°C from an open tank at ground level to a closed overhead tank at a gauge pressure of 2 atm kept 3m above the ground. The density of the acid is 1850kg/m^3 and the viscosity is 25 centipoises. Neglect frictional losses.

   (b) Explain the important properties of fluid. [8+8]

7. (a) Define fanning friction factor. How is it related to the pressure drop.

   (b) Explain the development of boundary layer in a flat plate. [5+11]

8. (a) Distinguish between Kozeny-Carmon equation and Ergun's equation.

   (b) Explain the method of reducing skin friction drag. [8+8]

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Code No: R07A12301 **R07** **Set No. 4**

I B.Tech Examinations,June 2011
PROCESS ENGINEERING PRINCIPLES
Bio-Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Define fanning friction factor. How is it related to the pressure drop.
   (b) Explain the development of boundary layer in a flat plate. [5+11]
2. (a) Explain the purpose of using a non return valve in the suction pipe of a centrifugal pump.
   (b) Discuss about the important flow meters used in industry. What are the advantages and disadvantages over each other?
   (c) What is the use of foot valve and strainer in centrifugal pump? [6+8+2]
3. Enumerate Newtons law of viscosity. Explain the importance of viscosity in fluid motion. What is the effect of temperature on viscosity of water and that of air? [16]
4. (a) Distinguish between Kozeny-Carmon equation and Ergun's equation.
   (b) Explain the method of reducing skin friction drag. [8+8]
5. (a) How are bio-chemical reactions different from chemical reactions?
   (b) Briefly explain the steps in development of a complete bioprocess for commercial manufacture of a new recombinant DNA derived product. [8+8]
6. (a) Calculate the power required and the pressure which should be developed by a pump of efficiency 80% to pump 60 liters/ min. of 98% sulfuric acid at 25^{o}C from an open tank at ground level to a closed overhead tank at a gauge pressure of 2 atm kept 3m above the ground. The density of the acid is 1850kg/m^3 and the viscosity is 25 centipoises. Neglect frictional losses.
   (b) Explain the important properties of fluid. [8+8]
7. (a) 28.8 ml of H_2SO_4 was needed for the complete precipitation of $BaSO_4$ from 100 g of a 15% solution of $BaCl_2$. Find the normality of the H_2SO_4 solution.
   (b) The solubility of potassium chlorate at 70 ^{0}C is 30.2 g and at 30 ^{0}C is 10.1 g in 100g of water. How many grams of potassium chlorate will precipitate from 350 g of a solution saturated at 70 ^{0}C if it is cooled to 30 ^{0}C? [8+8]
8. (a) With a neat sketch explain the working of an air lift pump. Discuss its advantages and disadvantages over centrifugal pump.

(b) Water is pumped from a ground level reservoir to an overhead tank through a 7.5 cm ID pipe as shown in figure 6b

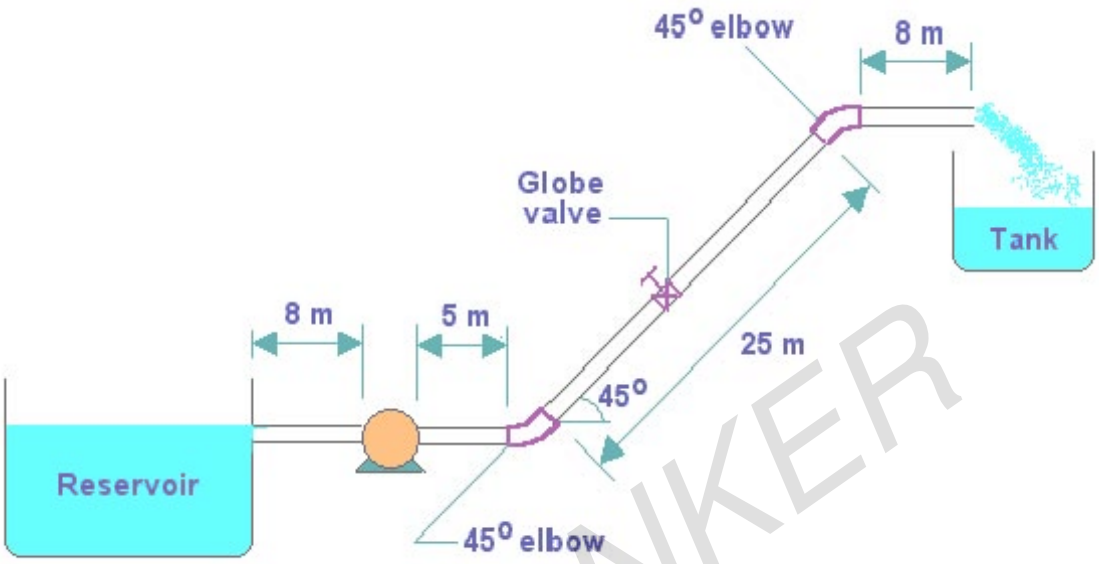

Figure 6b

i. What pressure is needed at the outlet of the pump to supply water to the tank at the rate of 100 ltr/min?

ii. What is the power required for the pump, if the pump is only 60% efficient?

Data:
$\mu = 1$ cP; $\rho = 1$ g/ml.
Equivalent length of fittings (L_e/D):
Globe valve (open) : 300
45^o elbow : 15
Fanning friction factor for turbulent flow is given by: f = 0.079 $(NR_e)^{-0.25}$.

[8+8]

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Code No: R07A12301 **R07** **Set No. 1**

I B.Tech Examinations,June 2011
PROCESS ENGINEERING PRINCIPLES
Bio-Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) With a neat sketch explain the working of an air lift pump. Discuss its advantages and disadvantages over centrifugal pump.

   (b) Water is pumped from a ground level reservoir to an overhead tank through a 7.5 cm ID pipe as shown in figure 6b

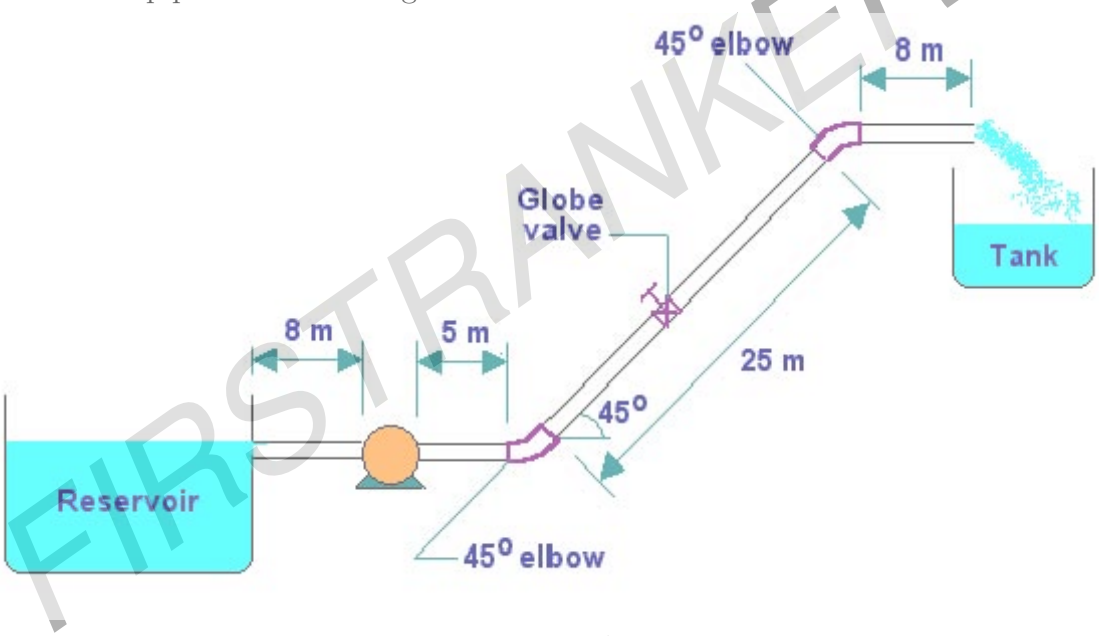

Figure 6b

   i. What pressure is needed at the outlet of the pump to supply water to the tank at the rate of 100 ltr/min?

   ii. What is the power required for the pump, if the pump is only 60% efficient?

   Data:
   $\mu = 1$ cP; $\rho = 1$ g/ml.
   Equivalent length of fittings (L_e/D):
   Globe valve (open) : 300
   45^o elbow : 15
   Fanning friction factor for turbulent flow is given by: f = 0.079 $(NR_e)^{-0.25}$. [8+8]

2. (a) Distinguish between Kozeny-Carmon equation and Ergun's equation.

   (b) Explain the method of reducing skin friction drag. [8+8]

3. (a) How are bio-chemical reactions different from chemical reactions?

(b) Briefly explain the steps in development of a complete bioprocess for commercial manufacture of a new recombinant DNA derived product. [8+8]

4. (a) Calculate the power required and the pressure which should be developed by a pump of efficiency 80% to pump 60 liters/ min. of 98% sulfuric acid at 25^{o}C from an open tank at ground level to a closed overhead tank at a gauge pressure of 2 atm kept 3m above the ground. The density of the acid is 1850kg/m^3 and the viscosity is 25 centipoises. Neglect frictional losses.

   (b) Explain the important properties of fluid. [8+8]

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Code No: R07A12301 **R07** **Set No. 3**

I B.Tech Examinations,June 2011
PROCESS ENGINEERING PRINCIPLES
Bio-Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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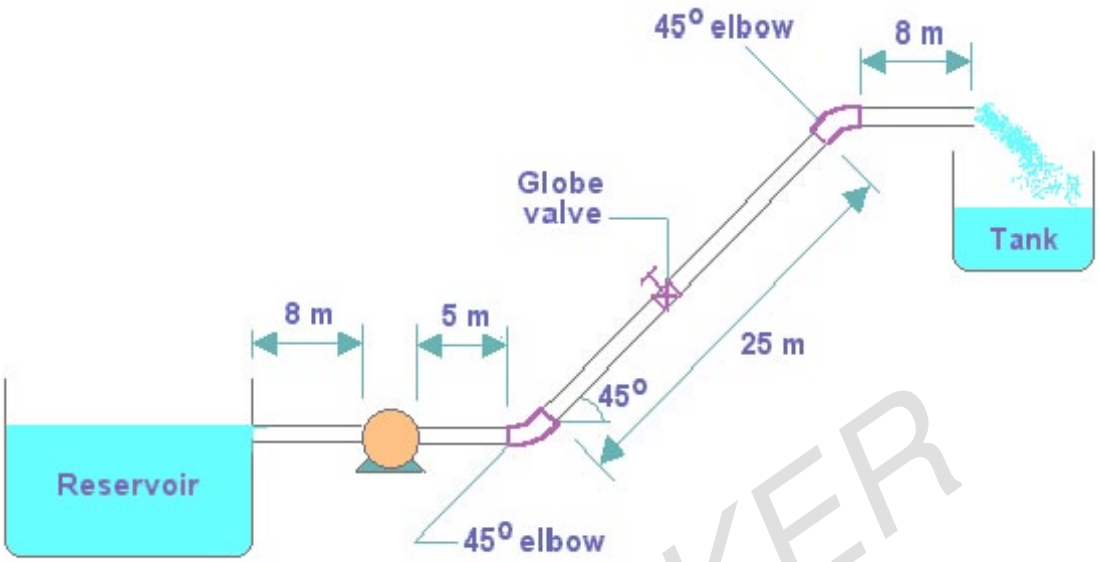
1. (a) Explain the purpose of using a non return valve in the suction pipe of a centrifugal pump.
   (b) Discuss about the important flow meters used in industry. What are the advantages and disadvantages over each other?
   (c) What is the use of foot valve and strainer in centrifugal pump? [6+8+2]
2. (a) Distinguish between Kozeny-Carmon equation and Ergun's equation.
   (b) Explain the method of reducing skin friction drag. [8+8]
3. Enumerate Newtons law of viscosity. Explain the importance of viscosity in fluid motion. What is the effect of temperature on viscosity of water and that of air? [16]
4. (a) Define fanning friction factor. How is it related to the pressure drop.
   (b) Explain the development of boundary layer in a flat plate. [5+11]
5. (a) How are bio-chemical reactions different from chemical reactions?
   (b) Briefly explain the steps in development of a complete bioprocess for commercial manufacture of a new recombinant DNA derived product. [8+8]
6. (a) With a neat sketch explain the working of an air lift pump. Discuss its advantages and disadvantages over centrifugal pump.
   (b) Water is pumped from a ground level reservoir to an overhead tank through a 7.5 cm ID pipe as shown in figure 6b

Code No: R07A12301 **R07** **Set No. 3**



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