Code No: R05210106 **R05** **Set No. 2**

II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010

FLUID MECHANICS
Civil Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Derive an equation for discharg of an orifice meter.

   (b) An orifice meter with orifice diameter 15cm is inserted in a pipe of 30cm diameter. The pressure gauges fitted upstream and downstream of the orifice meter give readings of 14.715 N/cm^2 and 9.81 N/cm^2 respectively. Find the rate of flow of water through the pipe in lit/sec. Take C_d = 0.6. [8+8]

2. (a) Explain the phenomenon of Capillarity. Obtain an expression for capillary rise of a liquid.

   (b) A pressure gauge is fitted at the bottom of a closed vessel to which a simple manometer is also fitted as shown in figure Determine the reading indicated by the pressurge gauge if manometric liquid is mercury. (figure2b) [8+8]

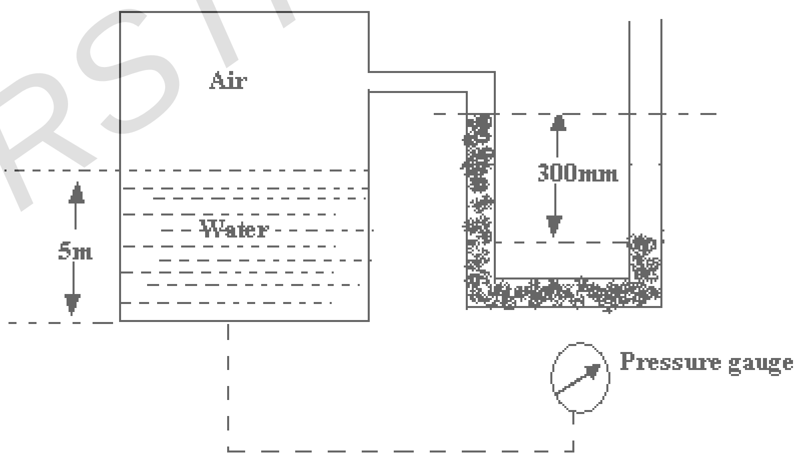


Figure 2b

3. (a) What do you mean by Hydrostatic pressure.

   (b) Define Total pressure and centre of pressure

   (c) A circular plate 2.5m in diameter is submerged in water as shown in figure 6c. Its greatest and least depths below free surface of water are 3m and 2m respectively. Find

      i. Total pressure on front face of the plate and
      ii. the position of centre of pressure [3+4+9]

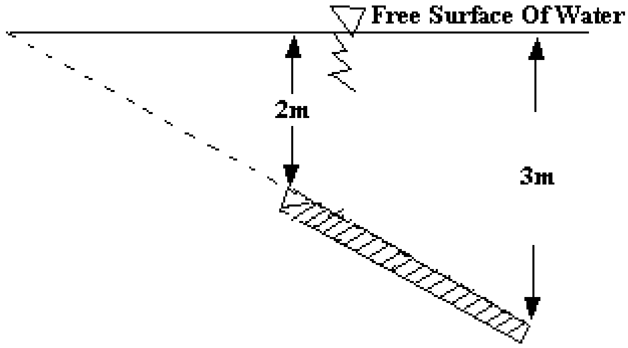


Figure 3c

4. (a) Explain the phenomenon of boundary layer separation and its influence on the drag of an immersed body.

   (b) In a flat plate of 2m length and 1m wide, experiments were conducted in a wind tunnel with a wind speed of 50 Km/hr. The plate is kept at such an angle that the coefficients of drag and lift are 0.18 and 0.9 respectively. Determine drag force, lift force, resultant force and power exerted by the air stream on the plate. Take density of air as $1.15Kg/m^3$. [7+9]

5. (a) Derive and expression for head lost due to sudden contraction of a pipe.

   (b) A pipe increases in diameter suddenly from 10 cm to 20 cm. If the discharge of water through the pipe is 100 lit/sec., determine the loss of head due to sudden enlargement of cross sectional area. Also determine the difference of pressure between two sections of the pipe line. [8+8]

6. (a) State and explain equation of continuity for incompressible fluid and compressible fluid.

   (b) Give examples of stream line flow, turbulent flow, steady flow, unsteady flow, uniform flow and non-uniform flow.

   (c) Oil flows through a pipeline which contracts from 45 cm diameter at A to 30 cm diameter at B and then branches into two pipes C and D. The diameter of the pipe C is 15 cm and diameter of the pipe D is 20 cm. If the velocity at A be 1.8 m/sec and that at D be 3.6 m/sec Determine (figure8c)

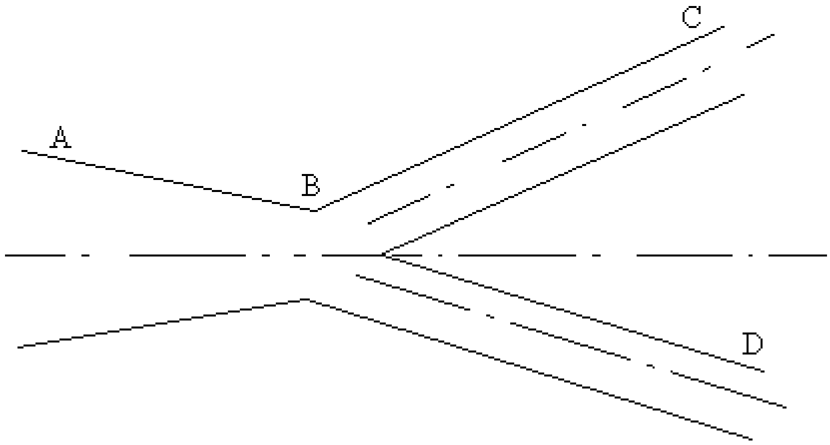
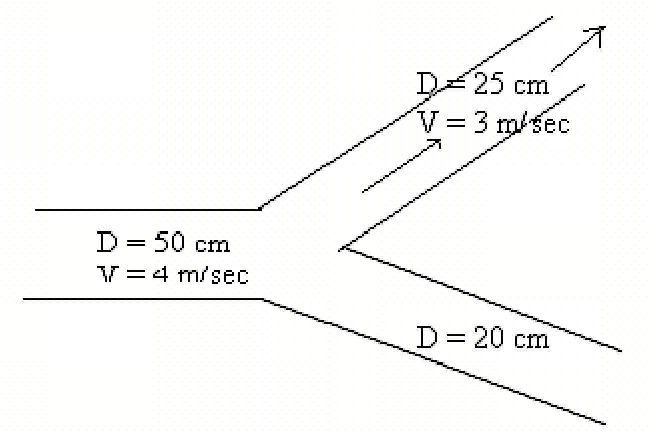


Figure 6c

i. Velocity at section B
ii. Discharge at D
iii. Discharge at C
iv. Velocity at C. [3+4+9]

7. (a) What is couette flow. Explain.
   (b) What is the significance of Reynolds number. Also define viscous flow, velocity gradient and pressure gradient.
   (c) Calculate the pressure gradient along the flow, average velocity and discharge for an oil of viscosity 0.02 N see/ m^2 flowing between two stationary parallel plates 1m wide maintained 1 cm apart. The velocity midway between the plates is 2.5 m/sec. [3+4+9]

8. (a) What is a flow net. Draw a typical flow net and explain its applications. What are the limitations of flow nets.
   (b) A pipe 50 cm in diameter branches into two pipes of diameters 25 cm and 20 cm respectively as shown in figure 7. It the average velocity in 50 cm diameter pipe is 4m/sec find
      i. Discharge through 50 cm diameter pipe and
      ii. velocity in 20 cm diameter pipe if the average velocity in 25 cm pipe is 3 m/sec



[8+8]

Figure 7

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Code No: R05210106 **R05** **Set No. 4**

II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010

FLUID MECHANICS
Civil Engineering

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

Answer any FIVE Questions
All Questions carry equal marks
⋆ ⋆ ⋆ ⋆ ⋆

1. (a) What is a flow net. Draw a typical flow net and explain its applications. What are the limitations of flow nets.
   (b) A pipe 50 cm in diameter branches into two pipes of diameters 25 cm and 20 cm respectively as shown in figure 7. It the average velocity in 50 cm diameter pipe is 4m/sec find
      i. Discharge through 50 cm diameter pipe and
      ii. velocity in 20 cm diameter pipe if the average velocity in 25 cm pipe is 3 m/sec

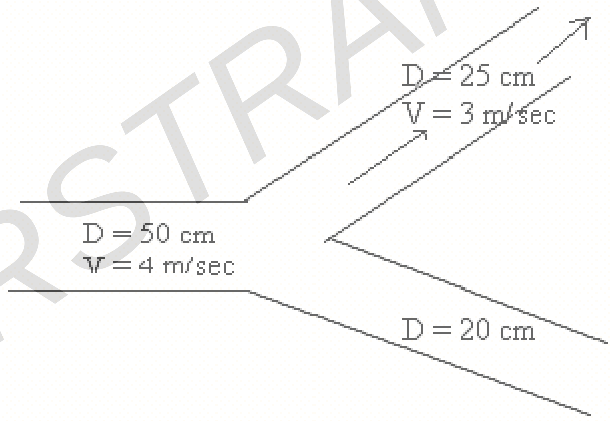

Figure 7

2. (a) What is couette flow. Explain.
   (b) What is the significance of Reynolds number. Also define viscous flow, velocity gradient and pressure gradient.
   (c) Calculate the pressure gradient along the flow, average velocity and discharge for an oil of viscosity 0.02 N see/ m^2 flowing between two stationary parallel plates 1m wide maintained 1 cm apart. The velocity midway between the plates is 2.5 m/sec. [3+4+9]

3. (a) Derive and expression for head lost due to sudden contraction of a pipe.
   (b) A pipe increases in diameter suddenly from 10 cm to 20 cm. If the discharge of water through the pipe is 100 lit/sec., determine the loss of head due to sudden enlargement of cross sectional area. Also determine the difference of pressure between two sections of the pipe line. [8+8]

4. (a) State and explain equation of continuity for incompressible fluid and compressible fluid.
   (b) Give examples of stream line flow, turbulent flow, steady flow, unsteady flow, uniform flow and non-uniform flow.
   (c) Oil flows through a pipeline which contracts from 45 cm diameter at A to 30 cm diameter at B and then branches into two pipes C and D. The diameter of the pipe C is 15 cm and diameter of the pipe D is 20 cm. If the velocity at A be 1.8 m/sec and that at D be 3.6 m/sec Determine (figure8c)

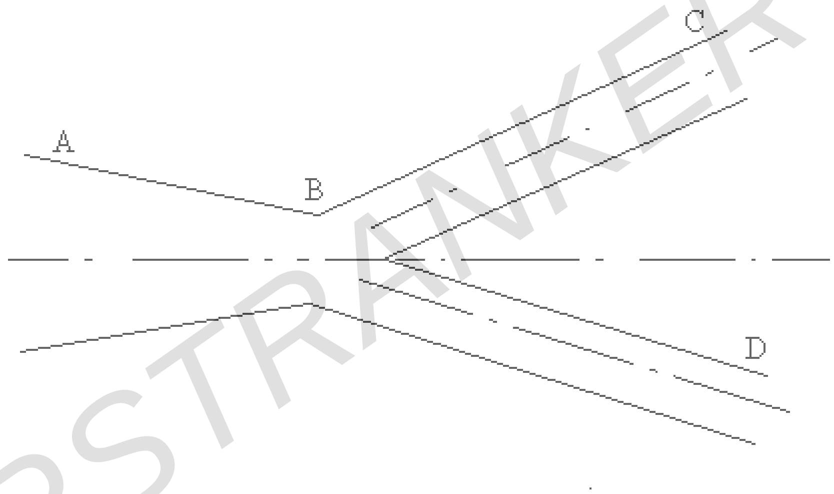

Figure 8c

   i. Velocity at section B
   ii. Discharge at D
   iii. Discharge at C
   iv. Velocity at C. [3+4+9]

5. (a) Explain the phenomenon of boundary layer separation and its influence on the drag of an immersed body.
   (b) In a flat plate of 2m length and 1m wide, experiments were conducted in a wind tunnel with a wind speed of 50 Km/hr. The plate is kept at such an angle that the coefficients of drag and lift are 0.18 and 0.9 respectively. Determine drag force, lift force, resultant force and power exerted by the air stream on the plate. Take density of air as $1.15 Kg/m^3$. [7+9]

6. (a) What do you mean by Hydrostatic pressure.
   (b) Define Total pressure and centre of pressure
   (c) A circular plate 2.5m in diameter is submerged in water as shown in figure 6c. Its greatest and least depths below free surface of water are 3m and 2m respectively. Find

i. Total pressure on front face of the plate and
ii. the position of centre of pressure [3+4+9]

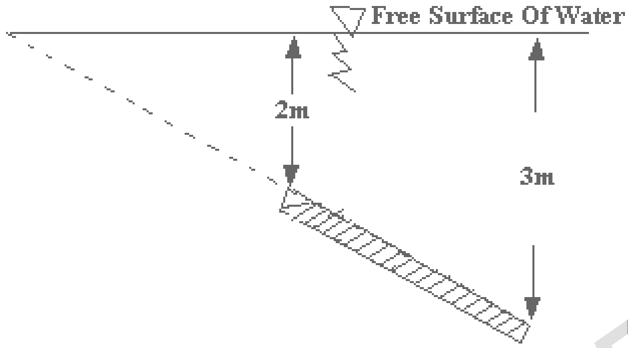

Figure 6c

7. (a) Derive an equation for discharg of an orifice meter.
   (b) An orifice meter with orifice diameter 15cm is inserted in a pipe of 30cm diameter. The pressure gauges fitted upstream and downstream of the orifice meter give readings of 14.715 N/cm^2 and 9.81 N/cm^2 respectively. Find the rate of flow of water through the pipe in lit/sec. Take $C_d = 0.6$. [8+8]

8. (a) Explain the phenomenon of Capillarity. Obtain an expression for capillary rise of a liquid.
   (b) A pressure gauge is fitted at the bottom of a closed vessel to which a simple manometer is also fitted as shown in figure Determine the reading indicated by the pressurge gauge if manometric liquid is mercury. (figure2b) [8+8]

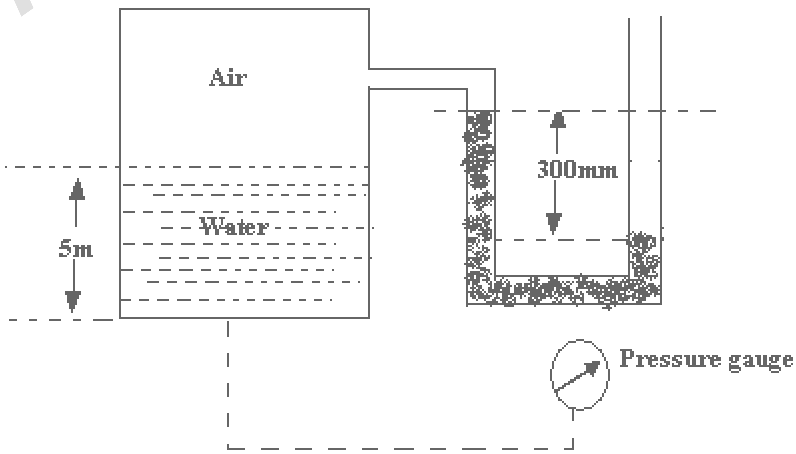

Figure 2b

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Code No: R05210106 **R05** **Set No. 1**

II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010

FLUID MECHANICS
Civil Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Derive and expression for head lost due to sudden contraction of a pipe.
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2. (a) What is a flow net. Draw a typical flow net and explain its applications. What are the limitations of flow nets.
   (b) A pipe 50 cm in diameter branches into two pipes of diameters 25 cm and 20 cm respectively as shown in figure 7. It the average velocity in 50 cm diameter pipe is 4m/sec find
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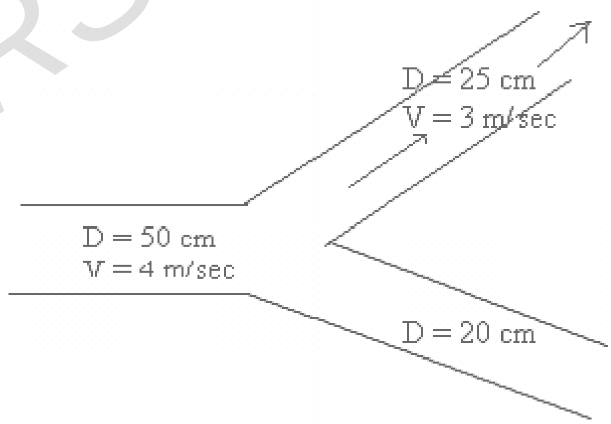

Figure 7

3. (a) What is couette flow. Explain.
   (b) What is the significance of Reynolds number. Also define viscous flow, velocity gradient and pressure gradient.
   (c) Calculate the pressure gradient along the flow, average velocity and discharge for an oil of viscosity 0.02 N see/ m^2 flowing between two stationary parallel plates 1m wide maintained 1 cm apart. The velocity midway between the plates is 2.5 m/sec. [3+4+9]

4. (a) State and explain equation of continuity for incompressible fluid and compressible fluid.

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   (c) Oil flows through a pipeline which contracts from 45 cm diameter at A to 30 cm diameter at B and then branches into two pipes C and D. The diameter of the pipe C is 15 cm and diameter of the pipe D is 20 cm. If the velocity at A be 1.8 m/sec and that at D be 3.6 m/sec Determine (figure8c)

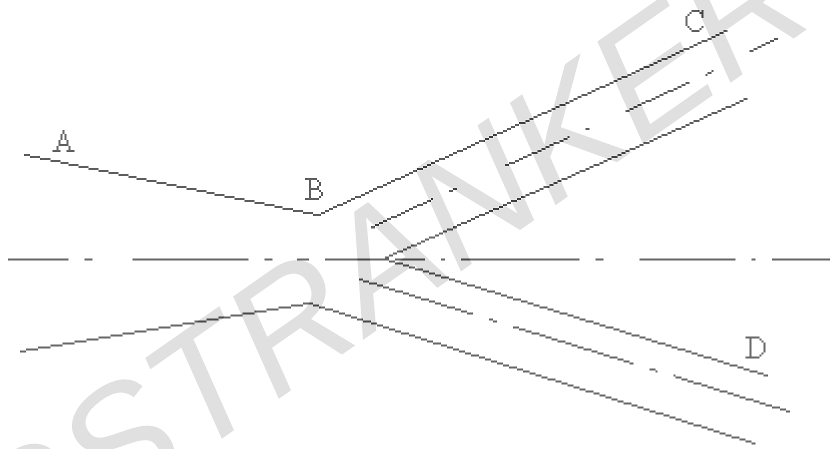

Figure 8c

   i. Velocity at section B
   ii. Discharge at D
   iii. Discharge at C
   iv. Velocity at C. [3+4+9]

5. (a) Explain the phenomenon of Capillarity. Obtain an expression for capillary rise of a liquid.

   (b) A pressure gauge is fitted at the bottom of a closed vessel to which a simple manometer is also fitted as shown in figure Determine the reading indicated by the pressurge gauge if manometric liquid is mercury. (figure2b) [8+8]

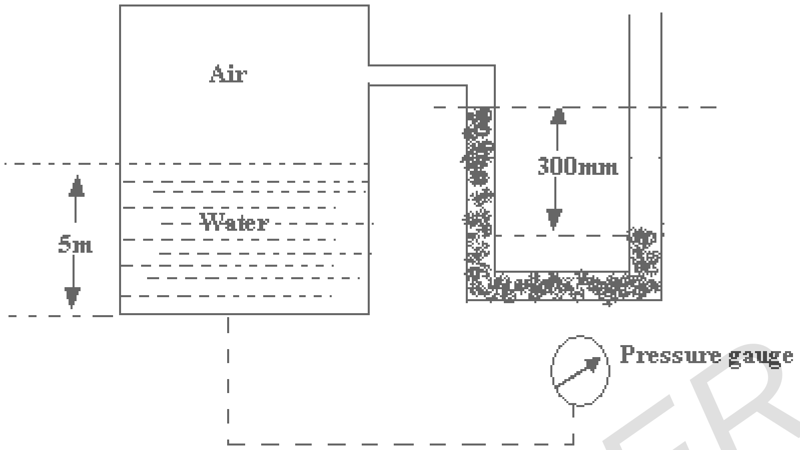

Figure 2b

6. (a) Derive an equation for discharg of an orifice meter.
   (b) An orifice meter with orifice diameter 15cm is inserted in a pipe of 30cm diameter. The pressure gauges fitted upstream and downstream of the orifice meter give readings of 14.715 N/cm^2 and 9.81 N/cm^2 respectively. Find the rate of flow of water through the pipe in lit/sec. Take $C_d = 0.6$. [8+8]

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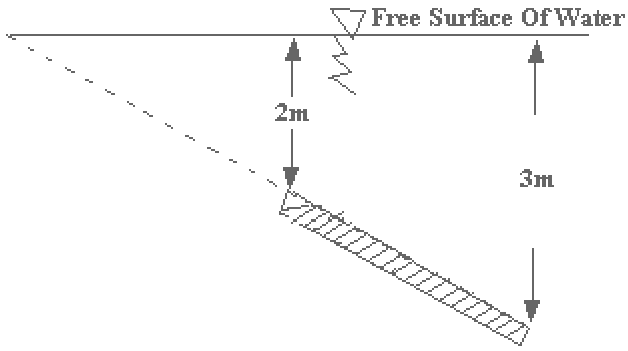

Figure 6c

⋆⋆⋆⋆⋆

Code No: R05210106 **R05** **Set No. 3**

II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010

FLUID MECHANICS
Civil Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

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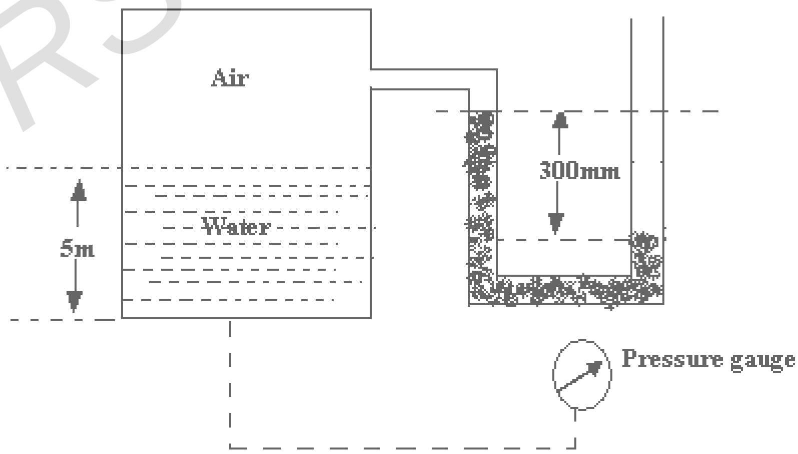

Figure 2b

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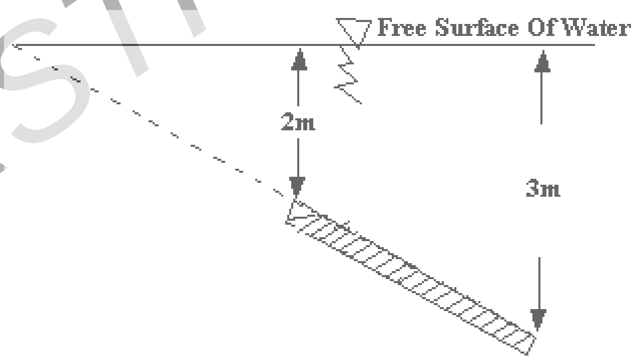

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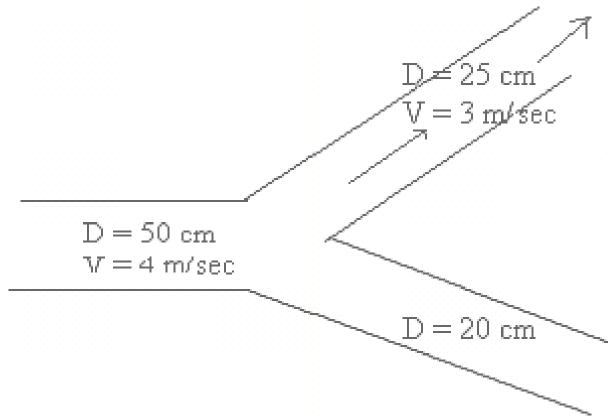

Figure 7

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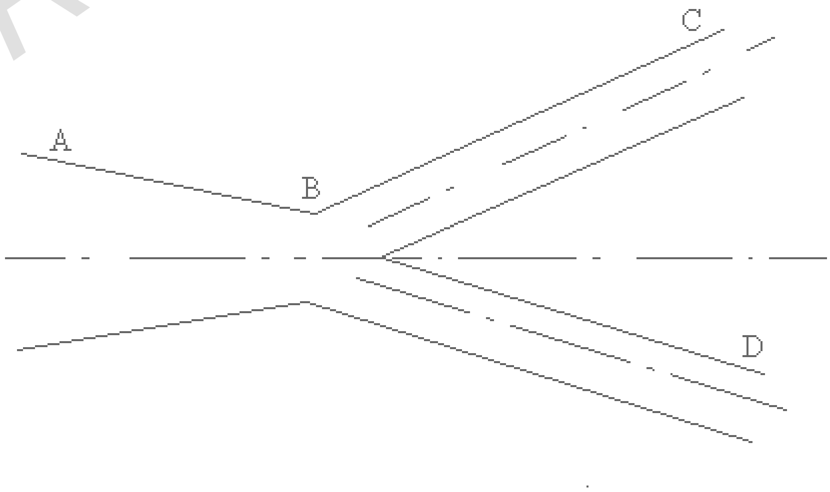

Figure 8c

   i. Velocity at section B
   ii. Discharge at D
   iii. Discharge at C
   iv. Velocity at C. [3+4+9]

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