Code No: NR220301 **NR** **Set No. 2**

II B.Tech II Semester Examinations,December 2010
MECHANICS OF FLUIDS
Common to Mechanical Engineering, Metallurgy And Material Technology
Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Sketch the velocity distribution of laminar flow in ideal and real fluid flow and explain it in detail.
   (b) A fluid of viscosity 0.883 pascal-sec and specific gravity 1.26 is pumped along a horizontal pipe of 65 m long and 10 cm diameter at a flow rate of 0.18 m^3/sec. Determine the Reynolds Number and calculate the pressure loss in the pipe if the flow is laminar. [8+8]

2. (a) Write a note on free vertex and forced vertex flow.
   (b) List out the engineering applications of Bernoulli's equation. [10+6]

3. (a) Explain the concept of flow through a long pipe along with a neat sketch.
   (b) A main pipe divides into two parallel pipes which again forms one pipe. The length and diameter for the first parallel pipe are 2000 m and 1.0 m respectively, while the length and diameter of second parallel pipe are 2000 m and 0.8 m. Find the rate of flow in each parallel pipe if total flow in the main is 3.0 cumecs. the coefficient of friction for each parallel pipe is same and equal to 0.006. [8+8]

4. (a) Define and distinguish between steady flow and uniform flow. Give two examples of each flow.
   (b) Derive continuity equation for 1-D flow. [8+8]

5. (a) Derive an expression for Bernoulli's equation for the adiabatic process.
   (b) What is the difference between isotropic and adiabatic process. [8+8]

6. (a) Draw a neat sketch showing the variation of drag coefficient for a sphere with Reynolds number and explain the salient features.
   (b) A 1 m by 1.2 m plate moves at 13.5 m / s in still air at an angle of 12^o with horizontal. Using $C_D = 0.17$ and $C_L = 0.72$. Determine
      i. the resultant force exerted by air on the plate
      ii. the friction force
      iii. the power required to keep plate moving. [6+10]

7. (a) The weight of 8 m^3 of a certain oil is 64 KN. Calculate its specific weight, mass density and specific gravity.
   (b) The weight of an object measured on ground level where $g = 9.81 m/sec^2$ is 35,000 N. Calculate its weight at the following locations

i. Moon $g_m = 1.62m/sec^2$,
ii. Sun , $g_s = 274.68m/sec^2$
iii. Mercury, $g_{me} = 3.53m/sec^2$
iv. Jupiter, $g_j = 26.0m/sec^2$
v. Saturn, $g_{sa} = 11.2m/sec^2$ and
vi. Venus, $g_v = 8.54m/sec^2$

Also find the mass density of the object on these planets. [8+8]

8. (a) Explain a concentric - cylinder viscometer in detail with Diagram. Also derive the expression to find the value of viscosity of a given fluid.
   (b) What is meant by hot wire Anemometer. Explain its working with a neat sketch. [8+8]

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Code No: NR220301 **NR** **Set No. 4**

II B.Tech II Semester Examinations,December 2010
MECHANICS OF FLUIDS
Common to Mechanical Engineering, Metallurgy And Material Technology
Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain a concentric - cylinder viscometer in detail with Diagram. Also derive the expression to find the value of viscosity of a given fluid.
   (b) What is meant by hot wire Anemometer. Explain its working with a neat sketch. [8+8]
2. (a) Explain the concept of flow through a long pipe along with a neat sketch.
   (b) A main pipe divides into two parallel pipes which again forms one pipe. The length and diameter for the first parallel pipe are 2000 m and 1.0 m respectively, while the length and diameter of second parallel pipe are 2000 m and 0.8 m. Find the rate of flow in each parallel pipe if total flow in the main is 3.0 cumecs. the coefficient of friction for each parallel pipe is same and equal to 0.006. [8+8]
3. (a) Write a note on free vertex and forced vertex flow.
   (b) List out the engineering applications of Bernoulli's equation. [10+6]
4. (a) Draw a neat sketch showing the variation of drag coefficient for a sphere with Reynolds number and explain the salient features.
   (b) A 1 m by 1.2 m plate moves at 13.5 m / s in still air at an angle of 12^o with horizontal. Using $C_D = 0.17$ and $C_L = 0.72$. Determine
      i. the resultant force exerted by air on the plate
      ii. the friction force
      iii. the power required to keep plate moving. [6+10]
5. (a) The weight of 8 m^3 of a certain oil is 64 KN. Calculate its specific weight, mass density and specific gravity.
   (b) The weight of an object measured on ground level where $g = 9.81 m/sec^2$ is 35,000 N. Calculate its weight at the following locations
      i. Moon $g_m = 1.62 m/sec^2$,
      ii. Sun , $g_s = 274.68 m/sec^2$
      iii. Mercury, $g_{me} = 3.53 m/sec^2$
      iv. Jupiter, $g_j = 26.0 m/sec^2$
      v. Saturn, $g_{sa} = 11.2 m/sec^2$ and
      vi. Venus, $g_v = 8.54 m/sec^2$

   Also find the mass density of the object on these planets. [8+8]

6. (a) Derive an expression for Bernoulli's equation for the adiabatic process.
   (b) What is the difference between isotropic and adiabatic process. [8+8]

7. (a) Define and distinguish between steady flow and uniform flow. Give two examples of each flow.
   (b) Derive continuity equation for 1-D flow. [8+8]

8. (a) Sketch the velocity distribution of laminar flow in ideal and real fluid flow and explain it in detail.
   (b) A fluid of viscosity 0.883 pascal-sec and specific gravity 1.26 is pumped along a horizontal pipe of 65 m long and 10 cm diameter at a flow rate of $0.18\ m^3/sec$. Determine the Reynolds Number and calculate the pressure loss in the pipe if the flow is laminar. [8+8]

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Code No: NR220301 **NR** **Set No. 1**

II B.Tech II Semester Examinations,December 2010
MECHANICS OF FLUIDS
Common to Mechanical Engineering, Metallurgy And Material Technology
Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Draw a neat sketch showing the variation of drag coefficient for a sphere with Reynolds number and explain the salient features.
   (b) A 1 m by 1.2 m plate moves at 13.5 m / s in still air at an angle of 12^o with horizontal. Using $C_D = 0.17$ and $C_L = 0.72$. Determine
      i. the resultant force exerted by air on the plate
      ii. the friction force
      iii. the power required to keep plate moving. [6+10]
2. (a) Explain a concentric - cylinder viscometer in detail with Diagram. Also derive the expression to find the value of viscosity of a given fluid.
   (b) What is meant by hot wire Anemometer. Explain its working with a neat sketch. [8+8]
3. (a) Explain the concept of flow through a long pipe along with a neat sketch.
   (b) A main pipe divides into two parallel pipes which again forms one pipe. The length and diameter for the first parallel pipe are 2000 m and 1.0 m respectively, while the length and diameter of second parallel pipe are 2000 m and 0.8 m. Find the rate of flow in each parallel pipe if total flow in the main is 3.0 cumecs. the coefficient of friction for each parallel pipe is same and equal to 0.006. [8+8]
4. (a) The weight of 8 m^3 of a certain oil is 64 KN. Calculate its specific weight, mass density and specific gravity.
   (b) The weight of an object measured on ground level where $g = 9.81 m/sec^2$ is 35,000 N. Calculate its weight at the following locations
      i. Moon $g_m = 1.62 m/sec^2$,
      ii. Sun , $g_s = 274.68 m/sec^2$
      iii. Mercury, $g_{me} = 3.53 m/sec^2$
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      v. Saturn, $g_{sa} = 11.2 m/sec^2$ and
      vi. Venus, $g_v = 8.54 m/sec^2$

      Also find the mass density of the object on these planets. [8+8]
5. (a) Write a note on free vertex and forced vertex flow.
   (b) List out the engineering applications of Bernoulli's equation. [10+6]

6. (a) Derive an expression for Bernoulli's equation for the adiabatic process.
   (b) What is the difference between isotropic and adiabatic process. [8+8]

7. (a) Sketch the velocity distribution of laminar flow in ideal and real fluid flow and explain it in detail.
   (b) A fluid of viscosity 0.883 pascal-sec and specific gravity 1.26 is pumped along a horizontal pipe of 65 m long and 10 cm diameter at a flow rate of 0.18 m^3/sec. Determine the Reynolds Number and calculate the pressure loss in the pipe if the flow is laminar. [8+8]

8. (a) Define and distinguish between steady flow and uniform flow. Give two examples of each flow.
   (b) Derive continuity equation for 1-D flow. [8+8]

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Code No: NR220301 **NR** **Set No. 3**

II B.Tech II Semester Examinations,December 2010
MECHANICS OF FLUIDS
Common to Mechanical Engineering, Metallurgy And Material Technology
Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Write a note on free vertex and forced vertex flow.
   (b) List out the engineering applications of Bernoulli's equation. [10+6]

2. (a) Draw a neat sketch showing the variation of drag coefficient for a sphere with Reynolds number and explain the salient features.
   (b) A 1 m by 1.2 m plate moves at 13.5 m / s in still air at an angle of 12^o with horizontal. Using $C_D = 0.17$ and $C_L = 0.72$. Determine
      i. the resultant force exerted by air on the plate
      ii. the friction force
      iii. the power required to keep plate moving. [6+10]

3. (a) The weight of 8 m^3 of a certain oil is 64 KN. Calculate its specific weight, mass density and specific gravity.
   (b) The weight of an object measured on ground level where $g = 9.81 m/sec^2$ is 35,000 N. Calculate its weight at the following locations
      i. Moon $g_m = 1.62 m/sec^2$,
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      iii. Mercury, $g_{me} = 3.53 m/sec^2$
      iv. Jupiter, $g_j = 26.0 m/sec^2$
      v. Saturn, $g_{sa} = 11.2 m/sec^2$ and
      vi. Venus, $g_v = 8.54 m/sec^2$

   Also find the mass density of the object on these planets. [8+8]

4. (a) Derive an expression for Bernoulli's equation for the adiabatic process.
   (b) What is the difference between isotropic and adiabatic process. [8+8]

5. (a) Explain the concept of flow through a long pipe along with a neat sketch.
   (b) A main pipe divides into two parallel pipes which again forms one pipe. The length and diameter for the first parallel pipe are 2000 m and 1.0 m respectively, while the length and diameter of second parallel pipe are 2000 m and 0.8 m. Find the rate of flow in each parallel pipe if total flow in the main is 3.0 cumecs. the coefficient of friction for each parallel pipe is same and equal to 0.006. [8+8]

6. (a) Explain a concentric - cylinder viscometer in detail with Diagram. Also derive the expression to find the value of viscosity of a given fluid.

(b) What is meant by hot wire Anemometer. Explain its working with a neat sketch. [8+8]

7. (a) Sketch the velocity distribution of laminar flow in ideal and real fluid flow and explain it in detail.

(b) A fluid of viscosity 0.883 pascal-sec and specific gravity 1.26 is pumped along a horizontal pipe of 65 m long and 10 cm diameter at a flow rate of 0.18 m^3/sec. Determine the Reynolds Number and calculate the pressure loss in the pipe if the flow is laminar. [8+8]

8. (a) Define and distinguish between steady flow and uniform flow. Give two examples of each flow.

(b) Derive continuity equation for 1-D flow. [8+8]

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