Code No: R05220302 **R05** **Set No. 2**

II B.Tech II Semester Examinations,December 2010
MECHANICS OF FLUIDS
Common to Mechanical Engineering, Automobile 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 briefly about the shock waves and how these shock waves are formed in convergent and divergent nozzle.

   (b) Find the velocity of air flowing at the outlet of a nozzle, fitted to a large vessel which contain air at a pressure of 294.3 N/cm^2 (abs) and at a temperature of 20^0C .The pressure at the outlet of the nozzle is 206 N/cm^2 (abs). Take K=1.4 and R=287 J/ kg K. [8+8]

2. (a) Show that the Kinetic energy correction factor for laminar flow through a circular pipe is equal to two(2).

   (b) A Sleeve, in which a shaft of diameter 75 mm, is running at 1200 rpm is having a radial clearance of 0.1mm. Calculate the torque resistance if the length of sleeve is 100 mm and the space is filled with oil of dynamic viscosity 0.096 pascel - second.. [8+8]

3. (a) For measuring small pressure differences, explain with sketches how an inclined U-tube manometer is used.

   (b) Explain three conditions of equilibrium of a floating body. [8+8]

4. (a) For a three-dimensional flow the velocity distribution is given by u = -x,v = 3-y and w= 3-z. What is the equation of a streamline passing through (1,2,2)

   (b) A steady flow can be non-uniform. Discuss. [10+6]

5. (a) Derive Euler's s equation of motion.

   (b) A pipe through which water is flowing is having diameters, 20cm and 10cm at the cross-section. I and II respectively. The velocity of water at section I is given 4.m/s. Find the velocity head at sections I and II and also rate of discharge. [10+6]

6. (a) Explain and differentiate between Pitot tube and Pitot Static Tube.

   (b) Water flows through a rectangular channel 1m wide and 0.5m deep and then over a sharp crested cipolletti weir of crust length 0.6m. If the water level in the channel is 0.225m above the weir crest. Calculate the discharge over the weir. Take Cd = 0.6 and make correction for the velocity of approach. [7+9]

7. (a) Explain with a neat sketch the boundary layer characteristics when a fluid is flowing over a flat plate.

(b) A thin flat plate 0.3 m wide and 0.6 m long is suspended and exposed parallel to air flowing with a velocity of 3 m/sec. Calculate drag force on both sides of the plate when the 0.3 m edge is oriented parallel to free stream. Consider flow to be laminar and assume for air kinematic viscosity is 0.18 stokes and density is 1.2 kg/m^3. [10+6]

8. (a) How the loss of energy at the entrance to the pipe and exit from the pipe is to be determined?

   (b) A horizontal pipeline 50 m long is connected to a water tank at one end and discharges freely into the atmosphere at the other end. For the first 30 m of its length from the tank, the pipe is 100 mm diameter and its diameter suddenly enlarged to 200 mm. The height of the water level in the tank is 10 m above the centre of the pipe. Determine the rate of flow. Take 4f = 0.04 for both sections of the pipe and consider minor losses. [6+10]

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Code No: R05220302 **R05** **Set No. 4**

II B.Tech II Semester Examinations,December 2010
MECHANICS OF FLUIDS
Common to Mechanical Engineering, Automobile 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) How the loss of energy at the entrance to the pipe and exit from the pipe is to be determined?
   (b) A horizontal pipeline 50 m long is connected to a water tank at one end and discharges freely into the atmosphere at the other end. For the first 30 m of its length from the tank, the pipe is 100 mm diameter and its diameter suddenly enlarged to 200 mm. The height of the water level in the tank is 10 m above the centre of the pipe. Determine the rate of flow. Take 4f = 0.04 for both sections of the pipe and consider minor losses. [6+10]

2. (a) For measuring small pressure differences, explain with sketches how an inclined U-tube manometer is used.
   (b) Explain three conditions of equilibrium of a floating body. [8+8]

3. (a) Derive Euler's s equation of motion.
   (b) A pipe through which water is flowing is having diameters, 20cm and 10cm at the cross-section. I and II respectively. The velocity of water at section I is given 4.m/s. Find the velocity head at sections I and II and also rate of discharge. [10+6]

4. (a) Explain with a neat sketch the boundary layer characteristics when a fluid is flowing over a flat plate.
   (b) A thin flat plate 0.3 m wide and 0.6 m long is suspended and exposed parallel to air flowing with a velocity of 3 m/sec. Calculate drag force on both sides of the plate when the 0.3 m edge is oriented parallel to free stream. Consider flow to be laminar and assume for air kinematic viscosity is 0.18 stokes and density is 1.2 kg/m^3. [10+6]

5. (a) Show that the Kinetic energy correction factor for laminar flow through a circular pipe is equal to two(2).
   (b) A Sleeve, in which a shaft of diameter 75 mm, is running at 1200 rpm is having a radial clearance of 0.1mm. Calculate the torque resistance if the length of sleeve is 100 mm and the space is filled with oil of dynamic viscosity 0.096 pascel - second.. [8+8]

6. (a) For a three-dimensional flow the velocity distribution is given by u = -x,v = 3-y and w= 3-z. What is the equation of a streamline passing through (1,2,2)

(b) A steady flow can be non-uniform. Discuss. [10+6]

7. (a) Explain briefly about the shock waves and how these shock waves are formed in convergent and divergent nozzle.

   (b) Find the velocity of air flowing at the outlet of a nozzle, fitted to a large vessel which contain air at a pressure of 294.3 N/cm^2 (abs) and at a temperature of 20^0C .The pressure at the outlet of the nozzle is 206 N/cm^2 (abs). Take K=1.4 and R=287 J/ kg K. [8+8]

8. (a) Explain and differentiate between Pitot tube and Pitot Static Tube.

   (b) Water flows through a rectangular channel 1m wide and 0.5m deep and then over a sharp crested cipolletti weir of crust length 0.6m. If the water level in the channel is 0.225m above the weir crest. Calculate the discharge over the weir. Take Cd = 0.6 and make correction for the velocity of approach. [7+9]

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Code No: R05220302 **R05** **Set No. 1**

II B.Tech II Semester Examinations,December 2010
MECHANICS OF FLUIDS
Common to Mechanical Engineering, Automobile 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 with a neat sketch the boundary layer characteristics when a fluid is flowing over a flat plate.
   (b) A thin flat plate 0.3 m wide and 0.6 m long is suspended and exposed parallel to air flowing with a velocity of 3 m/sec. Calculate drag force on both sides of the plate when the 0.3 m edge is oriented parallel to free stream. Consider flow to be laminar and assume for air kinematic viscosity is 0.18 stokes and density is 1.2 kg/m^3. [10+6]

2. (a) Show that the Kinetic energy correction factor for laminar flow through a circular pipe is equal to two(2).
   (b) A Sleeve, in which a shaft of diameter 75 mm, is running at 1200 rpm is having a radial clearance of 0.1mm. Calculate the torque resistance if the length of sleeve is 100 mm and the space is filled with oil of dynamic viscosity 0.096 pascel - second.. [8+8]

3. (a) Explain and differentiate between Pitot tube and Pitot Static Tube.
   (b) Water flows through a rectangular channel 1m wide and 0.5m deep and then over a sharp crested cipolletti weir of crust length 0.6m. If the water level in the channel is 0.225m above the weir crest. Calculate the discharge over the weir. Take Cd = 0.6 and make correction for the velocity of approach. [7+9]

4. (a) How the loss of energy at the entrance to the pipe and exit from the pipe is to be determined?
   (b) A horizontal pipeline 50 m long is connected to a water tank at one end and discharges freely into the atmosphere at the other end. For the first 30 m of its length from the tank, the pipe is 100 mm diameter and its diameter suddenly enlarged to 200 mm. The height of the water level in the tank is 10 m above the centre of the pipe. Determine the rate of flow. Take 4f = 0.04 for both sections of the pipe and consider minor losses. [6+10]

5. (a) Explain briefly about the shock waves and how these shock waves are formed in convergent and divergent nozzle.
   (b) Find the velocity of air flowing at the outlet of a nozzle, fitted to a large vessel which contain air at a pressure of 294.3 N/cm^2 (abs) and at a temperature of 20^0C .The pressure at the outlet of the nozzle is 206 N/cm^2 (abs). Take K=1.4 and R=287 J/ kg K. [8+8]

6. (a) For a three-dimensional flow the velocity distribution is given by u = -x,v = 3-y and w= 3-z. What is the equation of a streamline passing through (1,2,2)

   (b) A steady flow can be non-uniform. Discuss. [10+6]

7. (a) For measuring small pressure differences, explain with sketches how an inclined U-tube manometer is used.

   (b) Explain three conditions of equilibrium of a floating body. [8+8]

8. (a) Derive Euler's s equation of motion.

   (b) A pipe through which water is flowing is having diameters, 20cm and 10cm at the cross-section. I and II respectively. The velocity of water at section I is given 4.m/s. Find the velocity head at sections I and II and also rate of discharge. [10+6]

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Code No: R05220302 **R05** **Set No. 3**

II B.Tech II Semester Examinations,December 2010
MECHANICS OF FLUIDS
Common to Mechanical Engineering, Automobile 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) How the loss of energy at the entrance to the pipe and exit from the pipe is to be determined?
   (b) A horizontal pipeline 50 m long is connected to a water tank at one end and discharges freely into the atmosphere at the other end. For the first 30 m of its length from the tank, the pipe is 100 mm diameter and its diameter suddenly enlarged to 200 mm. The height of the water level in the tank is 10 m above the centre of the pipe. Determine the rate of flow. Take 4f = 0.04 for both sections of the pipe and consider minor losses. [6+10]
2. (a) For a three-dimensional flow the velocity distribution is given by u = -x,v = 3-y and w= 3-z. What is the equation of a streamline passing through (1,2,2)
   (b) A steady flow can be non-uniform. Discuss. [10+6]
3. (a) Derive Euler's s equation of motion.
   (b) A pipe through which water is flowing is having diameters, 20cm and 10cm at the cross-section. I and II respectively. The velocity of water at section I is given 4.m/s. Find the velocity head at sections I and II and also rate of discharge. [10+6]
4. (a) Show that the Kinetic energy correction factor for laminar flow through a circular pipe is equal to two(2).
   (b) A Sleeve, in which a shaft of diameter 75 mm, is running at 1200 rpm is having a radial clearance of 0.1mm. Calculate the torque resistance if the length of sleeve is 100 mm and the space is filled with oil of dynamic viscosity 0.096 pascel - second.. [8+8]
5. (a) Explain and differentiate between Pitot tube and Pitot Static Tube.
   (b) Water flows through a rectangular channel 1m wide and 0.5m deep and then over a sharp crested cipolletti weir of crust length 0.6m. If the water level in the channel is 0.225m above the weir crest. Calculate the discharge over the weir. Take Cd = 0.6 and make correction for the velocity of approach. [7+9]
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of the plate when the 0.3 m edge is oriented parallel to free stream. Consider flow to be laminar and assume for air kinematic viscosity is 0.18 stokes and density is 1.2 kg/m^3. [10+6]

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