Code No: 07A40105 **R07** **Set No. 2**

II B.Tech II Semester Examinations,April/May 2012
FLUID MECHANICS AND HYDRAULIC MACHINERY
Mechanical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Describe storage and pondage in detail
   (b) Draw a line diagram of general arrangement of a pumped storage power plant and explain. [8+8]

2. (a) A jet of water strikes with a velocity of 50 m/sec a flat fixed plate inclined at 30 degrees with the axis of the jet. The cross sectional area of the plate is 100 cm^2. Find the force exerted by the jet on the plate and the ratio in which the jet gets divided after striking.
   (b) Derive the equation for the impact of jet striking a curved plate at the centre when the plate is stationary. [8+8]

3. (a) Differentiate between stagnation pressure head and static pressure head with reference to a pitot tube. Explain with the help of a neat sketch.
   (b) A venturimeter of throat diameter 5cm is fitted into a 12.5 cm diameter water pipe line. The coefficient of discharge is 0.96. Calculate the flow in the pipe line when the reading on a mercury water differential U tube manometer connected to the upstream and throat sections shows a reading of 20 cm. [6+10]

4. (a) What is priming? Why is it necessary? Explain how it is done.
   (b) Find the number of pumps required to take water from a deep well under a total head of 156 m. Also, the pumps are identical and are running at 1000 r.p.m. The specific speed of each pump is given as 20 while the rated capacity of each pump is 150 lit/s. [8+8]

5. (a) How can you find the flow direction by applying Bernoulli's equation between two points?
   (b) A pipe line carrying Turpentine of relative density 0.87 changes in diameter from 300 mm at section X to 600mm at section Y which is 5m at a higher level. The pressures at section X and Y are 100 kPa and 80kPa respectively. The discharge of Turpentine in the pipe line is 350lit/sec. Determine the loss of hed and the direction of flow. [6+10]

6. (a) A Pelton wheel has to develop 13230 k W under a net head of 800 m while running at a speed of 600r.p.m. If the co-efficient of the jet = 0.97, speed ratio = 0.46 and the ratio of jet diameter is 1/16 of wheel diameter. Determine the following:
      i. The diameter of the pitch circle,

ii. The diameter of each jet,

iii. The quantity of water supplied to the wheel; and

iv. The number of jets required. Assume overall efficiency as 85 percent

(b) The inward flow reaction turbine develops 735 kW at 750 r.p.m. under a net head of 100 m. The guide vanes makes an angle of 15^0 with the tangent at inlet. The axial length of the blade at inlet is 0.1 times the outer diameter. The radial velocity of flow through the wheel is constant and the discharge from the wheel is radial. The blade thickness blocks 5 percent of the area of flow at inlet. The hydraulic efficiency of the wheel is 88% and overall efficiency is 84%. Determine:

i. The wheel diameter,

ii. The wheel width, and

iii. The blade angle at inlet. [8+8]

7. (a) What is the principle on which a peizometer works? Draw a neat sketch and explain. What are different types of the same?

(b) If the surface tension at the soap air interface is 0.088N/m, Calculate the internal pressure in a soap bubble of 3 cm diameter. [10+6]

8. (a) What is cavitation? How can it be avoided in reaction turbine?

(b) What is governing and how it is accomplished for different types of water turbines?

[8+8]

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Code No: 07A40105 **R07** **Set No. 4**

II B.Tech II Semester Examinations,April/May 2012
FLUID MECHANICS AND HYDRAULIC MACHINERY
Mechanical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) How can you find the flow direction by applying Bernoulli's equation between two points?
   (b) A pipe line carrying Turpentine of relative density 0.87 changes in diameter from 300 mm at section X to 600mm at section Y which is 5m at a higher level. The pressures at section X and Y are 100 kPa and 80kPa respectively. The discharge of Turpentine in the pipe line is 350lit/sec. Determine the loss of hed and the direction of flow. [6+10]

2. (a) Describe storage and pondage in detail
   (b) Draw a line diagram of general arrangement of a pumped storage power plant and explain. [8+8]

3. (a) What is cavitation? How can it be avoided in reaction turbine?
   (b) What is governing and how it is accomplished for different types of water turbines? [8+8]

4. (a) What is the principle on which a peizometer works? Draw a neat sketch and explain. What are different types of the same?
   (b) If the surface tension at the soap air interface is 0.088N/m, Calculate the internal pressure in a soap bubble of 3 cm diameter. [10+6]

5. (a) What is priming? Why is it necessary? Explain how it is done.
   (b) Find the number of pumps required to take water from a deep well under a total head of 156 m. Also, the pumps are identical and are running at 1000 r.p.m. The specific speed of each pump is given as 20 while the rated capacity of each pump is 150 lit/s. [8+8]

6. (a) A Pelton wheel has to develop 13230 k W under a net head of 800 m while running at a speed of 600r.p.m. If the co-efficient of the jet = 0.97, speed ratio = 0.46 and the ratio of jet diameter is 1/16 of wheel diameter. Determine the following:
      i. The diameter of the pitch circle,
      ii. The diameter of each jet,
      iii. The quantity of water supplied to the wheel; and
      iv. The number of jets required. Assume overall efficiency as 85 percent

(b) The inward flow reaction turbine develops 735 kW at 750 r.p.m. under a net head of 100 m. The guide vanes makes an angle of 15^0 with the tangent at inlet. The axial length of the blade at inlet is 0.1 times the outer diameter. The radial velocity of flow through the wheel is constant and the discharge from the wheel is radial. The blade thickness blocks 5 percent of the area of flow at inlet. The hydraulic efficiency of the wheel is 88% and overall efficiency is 84%. Determine:

i. The wheel diameter,

ii. The wheel width, and

iii. The blade angle at inlet. [8+8]

7. (a) Differentiate between stagnation pressure head and static pressure head with reference to a pitot tube. Explain with the help of a neat sketch.

(b) A venturimeter of throat diameter 5cm is fitted into a 12.5 cm diameter water pipe line. The coefficient of discharge is 0.96. Calculate the flow in the pipe line when the reading on a mercury water differential U tube manometer connected to the upstream and throat sections shows a reading of 20 cm. [6+10]

8. (a) A jet of water strikes with a velocity of 50 m/sec a flat fixed plate inclined at 30 degrees with the axis of the jet. The cross sectional area of the plate is 100 cm^2. Find the force exerted by the jet on the plate and the ratio in which the jet gets divided after striking.

(b) Derive the equation for the impact of jet striking a curved plate at the centre when the plate is stationary. [8+8]

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Code No: 07A40105 **R07** **Set No. 1**

II B.Tech II Semester Examinations,April/May 2012
FLUID MECHANICS AND HYDRAULIC MACHINERY
Mechanical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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   (b) Derive the equation for the impact of jet striking a curved plate at the centre when the plate is stationary. [8+8]

2. (a) What is the principle on which a peizometer works? Draw a neat sketch and explain. What are different types of the same?
   (b) If the surface tension at the soap air interface is 0.088N/m, Calculate the internal pressure in a soap bubble of 3 cm diameter. [10+6]

3. (a) How can you find the flow direction by applying Bernoulli's equation between two points?
   (b) A pipe line carrying Turpentine of relative density 0.87 changes in diameter from 300 mm at section X to 600mm at section Y which is 5m at a higher level. The pressures at section X and Y are 100 kPa and 80kPa respectively. The discharge of Turpentine in the pipe line is 350lit/sec. Determine the loss of hed and the direction of flow. [6+10]

4. (a) What is cavitation? How can it be avoided in reaction turbine?
   (b) What is governing and how it is accomplished for different types of water turbines? [8+8]

5. (a) Describe storage and pondage in detail
   (b) Draw a line diagram of general arrangement of a pumped storage power plant and explain. [8+8]

6. (a) What is priming? Why is it necessary? Explain how it is done.
   (b) Find the number of pumps required to take water from a deep well under a total head of 156 m. Also, the pumps are identical and are running at 1000 r.p.m. The specific speed of each pump is given as 20 while the rated capacity of each pump is 150 lit/s. [8+8]

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i. The diameter of the pitch circle,
ii. The diameter of each jet,
iii. The quantity of water supplied to the wheel; and
iv. The number of jets required. Assume overall efficiency as 85 percent

(b) The inward flow reaction turbine develops 735 kW at 750 r.p.m. under a net head of 100 m. The guide vanes makes an angle of 15^0 with the tangent at inlet. The axial length of the blade at inlet is 0.1 times the outer diameter. The radial velocity of flow through the wheel is constant and the discharge from the wheel is radial. The blade thickness blocks 5 percent of the area of flow at inlet. The hydraulic efficiency of the wheel is 88% and overall efficiency is 84%. Determine:

i. The wheel diameter,
ii. The wheel width, and
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8. (a) Differentiate between stagnation pressure head and static pressure head with reference to a pitot tube. Explain with the help of a neat sketch.

(b) A venturimeter of throat diameter 5cm is fitted into a 12.5 cm diameter water pipe line. The coefficient of discharge is 0.96. Calculate the flow in the pipe line when the reading on a mercury water differential U tube manometer connected to the upstream and throat sections shows a reading of 20 cm. [6+10]

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Code No: 07A40105 **R07** **Set No. 3**

II B.Tech II Semester Examinations,April/May 2012
FLUID MECHANICS AND HYDRAULIC MACHINERY
Mechanical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Describe storage and pondage in detail
   (b) Draw a line diagram of general arrangement of a pumped storage power plant and explain. [8+8]

2. (a) What is priming? Why is it necessary? Explain how it is done.
   (b) Find the number of pumps required to take water from a deep well under a total head of 156 m. Also, the pumps are identical and are running at 1000 r.p.m. The specific speed of each pump is given as 20 while the rated capacity of each pump is 150 lit/s. [8+8]

3. (a) A jet of water strikes with a velocity of 50 m/sec a flat fixed plate inclined at 30 degrees with the axis of the jet. The cross sectional area of the plate is 100 cm^2. Find the force exerted by the jet on the plate and the ratio in which the jet gets divided after striking.
   (b) Derive the equation for the impact of jet striking a curved plate at the centre when the plate is stationary. [8+8]

4. (a) What is the principle on which a peizometer works? Draw a neat sketch and explain. What are different types of the same?
   (b) If the surface tension at the soap air interface is 0.088N/m, Calculate the internal pressure in a soap bubble of 3 cm diameter. [10+6]

5. (a) A Pelton wheel has to develop 13230 k W under a net head of 800 m while running at a speed of 600r.p.m. If the co-efficient of the jet = 0.97, speed ratio = 0.46 and the ratio of jet diameter is 1/16 of wheel diameter. Determine the following:
      i. The diameter of the pitch circle,
      ii. The diameter of each jet,
      iii. The quantity of water supplied to the wheel; and
      iv. The number of jets required. Assume overall efficiency as 85 percent
   (b) The inward flow reaction turbine develops 735 kW at 750 r.p.m. under a net head of 100 m. The guide vanes makes an angle of 15^0 with the tangent at inlet. The axial length of the blade at inlet is 0.1 times the outer diameter. The radial velocity of flow through the wheel is constant and the discharge from the wheel is radial. The blade thickness blocks 5 percent of the area of flow at inlet. The hydraulic efficiency of the wheel is 88% and overall efficiency is 84%. Determine:

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6. (a) How can you find the flow direction by applying Bernoulli's equation between two points?
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[8+8]

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   (b) A venturimeter of throat diameter 5cm is fitted into a 12.5 cm diameter water pipe line. The coefficient of discharge is 0.96. Calculate the flow in the pipe line when the reading on a mercury water differential U tube manometer connected to the upstream and throat sections shows a reading of 20 cm. [6+10]

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