Code No: RR210201 | **RR** | **Set No. 2**

II B.Tech I Semester Examinations,November 2010
HYDRAULICS AND HYDRAULIC MACHINERY
Electrical And Electronics Engineering

Time: 3 hours   Max Marks: 80

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

1. The inlet and throat diameters of a horizontal venturimeter are 0.30m and 0.10m respectively. If pressure at inlet is 1.50kPa and the vacuum pressure at throat is 0.40m of mercury, calculate the flow rate. It may be presumed that 3% of differential head is lost between the inlet and throat section. Calculate coefficient of discharge. [16]

2. A square plate weighing 115N and of uniform thickness and 30 cm edge is hung so that horizontal jet of 2 cm diameter and having a velocity of 15 m/s impinges on the plate. The center line of the jet is 15 cm below the upper edge of the plate, and when the plate is vertical the jet strikes the plate normally and at its center. Find what force must be applied at the lower edge of the plate in order to keep plate vertical.If the plate is allowed to swing freely, find the inclination to vertical which the plate will assume under the action of jet. [16]

3. (a) Briefly explain the classification of flows.
   (b) What type of acceleration is to be expected if
       i. Streamlines are parallel and equidistant
       ii. Streamlines are straight and converging
       iii. Streamlines are curved but equispaced
       iv. Streamlines are curved and converging. [8+8]

4. Give the complete classification of Hydraulic turbines with examples. [16]

5. The impeller of a centrifugal pump has 1.2 m outside diameter. It is used to lift 1800 litres of water per second against a head of 6 m. Its vanes make an angle of 150^0 with the direction of motion at outlet and runs at 200 rpm. If the radial velocity of flow at outlet is 2.5 m/s, find the manometric efficiency. Also find the lowest speed to start the pump, if the diameter of the impeller at inlet is equal to half the diameter at exit. [16]

6. (a) Explain the different forms of energy in a fluid.
   (b) The cross-sectional area of a convergent pipe is so shaped that the velocity of flow along the centre line varies linearly from 1 m/s to 10 m/s in a distance of one metre. The pipe is inclined downward at an angle of 30^0 with horizontal. Determine the difference in pressure between the two points, assuming the specific weight of the liquid as $7.85 kN/m^3$. [8+8]

7. (a) Explain the terms:

1

      i. hydraulic gradient and

     ii. energy gradient.

       Can the hydraulic gradient line lie below the axis of the conduit?

(b) Two reservoirs have difference of water levels of 6m. They are connected by a pipe system which consists of a single pipe of 60cm diameter for the first 3000 m and then two pipes in parallel, each of 30 cm diameter and 3000 m length. Find the discharge. Take f = 0.04. [8+8]

8. (a) Define mass density, weight density, specific volume and specific gravity.

(b) A 30 cm diameter shaft revolves in a guide bearing of 60 cm long at 500 rpm. If the oil film bearing is 0.13 mm and viscosity of oil is $0.05 Ns/m^2$, find the power absorbed. [8+8]

$\star\star\star\star\star$

2

Code No: RR210201 | **RR** | **Set No. 4**

II B.Tech I Semester Examinations,November 2010
HYDRAULICS AND HYDRAULIC MACHINERY
Electrical And Electronics Engineering

Time: 3 hours
Max Marks: 80

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

1. (a) Explain the different forms of energy in a fluid.

   (b) The cross-sectional area of a convergent pipe is so shaped that the velocity of flow along the centre line varies linearly from 1 m/s to 10 m/s in a distance of one metre. The pipe is inclined downward at an angle of 30^0 with horizontal. Determine the difference in pressure between the two points, assuming the specific weight of the liquid as $7.85 kN/m^3$. [8+8]

2. The impeller of a centrifugal pump has 1.2 m outside diameter. It is used to lift 1800 litres of water per second against a head of 6 m. Its vanes make an angle of 150^0 with the direction of motion at outlet and runs at 200 rpm. If the radial velocity of flow at outlet is 2.5 m/s, find the manometric efficiency. Also find the lowest speed to start the pump, if the diameter of the impeller at inlet is equal to half the diameter at exit. [16]

3. (a) Define mass density, weight density, specific volume and specific gravity.

   (b) A 30 cm diameter shaft revolves in a guide bearing of 60 cm long at 500 rpm. If the oil film bearing is 0.13 mm and viscosity of oil is $0.05 Ns/m^2$, find the power absorbed. [8+8]

4. Give the complete classification of Hydraulic turbines with examples. [16]

5. A square plate weighing 115N and of uniform thickness and 30 cm edge is hung so that horizontal jet of 2 cm diameter and having a velocity of 15 m/s impinges on the plate. The center line of the jet is 15 cm below the upper edge of the plate, and when the plate is vertical the jet strikes the plate normally and at its center. Find what force must be applied at the lower edge of the plate in order to keep plate vertical.If the plate is allowed to swing freely, find the inclination to vertical which the plate will assume under the action of jet. [16]

6. (a) Briefly explain the classification of flows.

   (b) What type of acceleration is to be expected if

        i. Streamlines are parallel and equidistant
       ii. Streamlines are straight and converging
      iii. Streamlines are curved but equispaced
       iv. Streamlines are curved and converging. [8+8]

3

7. The inlet and throat diameters of a horizontal venturimeter are 0.30m and 0.10m respectively. If pressure at inlet is 1.50kPa and the vacuum pressure at throat is 0.40m of mercury, calculate the flow rate. It may be presumed that 3% of differential head is lost between the inlet and throat section. Calculate coefficient of discharge.

[16]

8. (a) Explain the terms:

   i. hydraulic gradient and

   ii. energy gradient.
      Can the hydraulic gradient line lie below the axis of the conduit?

   (b) Two reservoirs have difference of water levels of 6m. They are connected by a pipe system which consists of a single pipe of 60cm diameter for the first 3000 m and then two pipes in parallel, each of 30 cm diameter and 3000 m length. Find the discharge. Take f = 0.04. [8+8]

$\star\star\star\star\star$

4

$\boxed{\textbf{RR}}$ $\boxed{\textbf{Set No. 1}}$

II B.Tech I Semester Examinations,November 2010
HYDRAULICS AND HYDRAULIC MACHINERY
Electrical And Electronics Engineering

Time: 3 hours   Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
$\star\star\star\star\star$

1. (a) Define mass density, weight density, specific volume and specific gravity.

   (b) A 30 cm diameter shaft revolves in a guide bearing of 60 cm long at 500 rpm. If the oil film bearing is 0.13 mm and viscosity of oil is $0.05 Ns/m^2$, find the power absorbed. [8+8]

2. The impeller of a centrifugal pump has 1.2 m outside diameter. It is used to lift 1800 litres of water per second against a head of 6 m. Its vanes make an angle of 150^0 with the direction of motion at outlet and runs at 200 rpm. If the radial velocity of flow at outlet is 2.5 m/s, find the manometric efficiency. Also find the lowest speed to start the pump, if the diameter of the impeller at inlet is equal to half the diameter at exit. [16]

3. Give the complete classification of Hydraulic turbines with examples. [16]

4. The inlet and throat diameters of a horizontal venturimeter are 0.30m and 0.10m respectively. If pressure at inlet is 1.50kPa and the vacuum pressure at throat is 0.40m of mercury, calculate the flow rate. It may be presumed that 3% of differential head is lost between the inlet and throat section. Calculate coefficient of discharge. [16]

5. (a) Explain the different forms of energy in a fluid.

   (b) The cross-sectional area of a convergent pipe is so shaped that the velocity of flow along the centre line varies linearly from 1 m/s to 10 m/s in a distance of one metre. The pipe is inclined downward at an angle of 30^0 with horizontal. Determine the difference in pressure between the two points, assuming the specific weight of the liquid as $7.85kN/m^3$. [8+8]

6. (a) Explain the terms:
      i. hydraulic gradient and
      ii. energy gradient.
         Can the hydraulic gradient line lie below the axis of the conduit?

   (b) Two reservoirs have difference of water levels of 6m. They are connected by a pipe system which consists of a single pipe of 60cm diameter for the first 3000 m and then two pipes in parallel, each of 30 cm diameter and 3000 m length. Find the discharge. Take f = 0.04. [8+8]

7. (a) Briefly explain the classification of flows.

   (b) What type of acceleration is to be expected if

    i. Streamlines are parallel and equidistant

    ii. Streamlines are straight and converging

    iii. Streamlines are curved but equispaced

    iv. Streamlines are curved and converging.   [8+8]

8. A square plate weighing 115N and of uniform thickness and 30 cm edge is hung so that horizontal jet of 2 cm diameter and having a velocity of 15 m/s impinges on the plate. The center line of the jet is 15 cm below the upper edge of the plate, and when the plate is vertical the jet strikes the plate normally and at its center. Find what force must be applied at the lower edge of the plate in order to keep plate vertical.If the plate is allowed to swing freely, find the inclination to vertical which the plate will assume under the action of jet.   [16]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: RR210201 $\boxed{\textbf{RR}}$ $\boxed{\textbf{Set No. 3}}$

II B.Tech I Semester Examinations,November 2010
HYDRAULICS AND HYDRAULIC MACHINERY
Electrical And Electronics Engineering
Time: 3 hours Max Marks: 80
Answer any FIVE Questions
All Questions carry equal marks
⋆ ⋆ ⋆ ⋆ ⋆

1. Give the complete classification of Hydraulic turbines with examples. [16]

2. (a) Briefly explain the classification of flows.
   (b) What type of acceleration is to be expected if
      i. Streamlines are parallel and equidistant
      ii. Streamlines are straight and converging
      iii. Streamlines are curved but equispaced
      iv. Streamlines are curved and converging. [8+8]

3. The inlet and throat diameters of a horizontal venturimeter are 0.30m and 0.10m respectively. If pressure at inlet is 1.50kPa and the vacuum pressure at throat is 0.40m of mercury, calculate the flow rate. It may be presumed that 3% of differential head is lost between the inlet and throat section. Calculate coefficient of discharge.
[16]

4. A square plate weighing 115N and of uniform thickness and 30 cm edge is hung so that horizontal jet of 2 cm diameter and having a velocity of 15 m/s impinges on the plate. The center line of the jet is 15 cm below the upper edge of the plate, and when the plate is vertical the jet strikes the plate normally and at its center. Find what force must be applied at the lower edge of the plate in order to keep plate vertical.If the plate is allowed to swing freely, find the inclination to vertical which the plate will assume under the action of jet. [16]

5. The impeller of a centrifugal pump has 1.2 m outside diameter. It is used to lift 1800 litres of water per second against a head of 6 m. Its vanes make an angle of 150^0 with the direction of motion at outlet and runs at 200 rpm. If the radial velocity of flow at outlet is 2.5 m/s, find the manometric efficiency. Also find the lowest speed to start the pump, if the diameter of the impeller at inlet is equal to half the diameter at exit. [16]

6. (a) Explain the different forms of energy in a fluid.
   (b) The cross-sectional area of a convergent pipe is so shaped that the velocity of flow along the centre line varies linearly from 1 m/s to 10 m/s in a distance of one metre. The pipe is inclined downward at an angle of 30^0 with horizontal. Determine the difference in pressure between the two points, assuming the specific weight of the liquid as $7.85kN/m^3$. [8+8]

7. (a) Define mass density, weight density, specific volume and specific gravity.

(b) A 30 cm diameter shaft revolves in a guide bearing of 60 cm long at 500 rpm. If the oil film bearing is 0.13 mm and viscosity of oil is $0.05 Ns/m^2$, find the power absorbed. [8+8]

8. (a) Explain the terms:

    i. hydraulic gradient and

    ii. energy gradient.

    Can the hydraulic gradient line lie below the axis of the conduit?

(b) Two reservoirs have difference of water levels of 6m. They are connected by a pipe system which consists of a single pipe of 60cm diameter for the first 3000 m and then two pipes in parallel, each of 30 cm diameter and 3000 m length. Find the discharge. Take f = 0.04. [8+8]

$\star\star\star\star\star$

8