

Code No: R05210202

R05**Set No. 2**

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

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

Answer any FIVE Questions
All Questions carry equal marks

1. (a) How does the Kaplan turbine get its name? Explain its construction and working.
 (b) Explain different efficiencies and working proportions of a Kaplan turbine in detail? [8+8]
2. (a) List all hydraulic losses, Mechanical losses and Leakage losses of a centrifugal pump. Explain when can centrifugal pumps be arranged in series and in parallel.
 (b) How can you find the power required to drive a reciprocating pump? Define slip of a reciprocating pump. [8+8]
3. (a) What is the difference between U tube differential manometers and inverted U Tube manometers? Where are they used?
 (b) A plate having an area of $0.6m^2$ is sliding down the inclined plane at 30° to the horizontal with a velocity of 0.36 m/sec. There is a cushion of fluid 1.8 mm thick between the plane and the plate. Find the viscosity of the fluid if the weight of the plate is 280 N. [8+8]
4. (a) Derive an expression for head loss due to sudden enlargement of a pipe
 (b) An oil of specific gravity 0.85 and viscosity $5CP$ flows through a pipe of diameter $400mm$ at the rate of 50 lit/sec. Find the head lost in friction in this pipe of length $1000Km$. Assume that $f = 0.079/R_N$ where R_N is Reynolds Number. [8+8]
5. (a) List and write elaborately about the elements of Hydroelectric station with neat sketches.
 (b) The head and discharge of a hydro electric plant are $28m$ and $330m^3/sec$ respectively. The installed turbine works with an efficiency of 86% . Find the power developed. [10+6]
6. (a) Show the governing mechanism of a Pelton wheel turbine with a neat sketch and explain how it works.
 (b) A Francis turbine produces 6750 Kw at 300 rpm under a net head of $45m$ with an overall efficiency of 85% . What would be revolutions per minute, discharge and brake power of the turbine under a net head of $60m$ under homologous conditions. [8+8]
7. (a) Derive the expressions for force and work done per second by the jet when it strikes the inclined plate moving in the direction of the jet.

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- (b) A jet of water of diameter 70mm moving with a velocity of 40m/sec strikes a curved fixed plate tangentially at one end at an angle of 30° to the horizontal. The jet leaves the plate at an angle of 20° to the horizontal. Find the force exerted by the jet on the plate in the horizontal and vertical direction. [8+8]
8. (a) The water flows in a pipe line, whose diameter which changes from 20cm at one end 'A' to 50cm at another end 'B'. Pressures at two ends are $78.5kN/m^2$ and $58.9kN/m^2$ respectively. The flow rate is 200 litres per second. End B is higher than end A by 3m. Determine the direction of flow.
- (b) What are the applications of Bernoulli's equation? [8+8]

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2. (a) List and write elaborately about the elements of Hydroelectric station with neat sketches.
 (b) The head and discharge of a hydro electric plant are 28m and $330\text{m}^3/\text{sec}$ respectively. The installed turbine works with an efficiency of 86%. Find the power developed. [10+6]
3. (a) Derive an expression for head loss due to sudden enlargement of a pipe
 (b) An oil of specific gravity 0.85 and viscosity 5CP flows through a pipe of diameter 400mm at the rate of 50 lit/sec. Find the head lost in friction in this pipe of length 1000Km. Assume that $f = 0.079/R_N$ where R_N is Reynolds Number. [8+8]
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 (b) What are the applications of Bernoulli's equation? [8+8]
5. (a) Show the governing mechanism of a Pelton wheel turbine with a neat sketch and explain how it works.
 (b) A Francis turbine produces 6750 Kw at 300 rpm under a net head of 45m with an overall efficiency of 85%. What would be revolutions per minute, discharge and brake power of the turbine under a net head of 60m under homologous conditions. [8+8]
6. (a) How does the Kaplan turbine get its name? Explain its construction and working.
 (b) Explain different efficiencies and working proportions of a Kaplan turbine in detail? [8+8]

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7. (a) What is the difference between U tube differential manometers and inverted U Tube manometers? Where are they used?
- (b) A plate having an area of $0.6m^2$ is sliding down the inclined plane at 30° to the horizontal with a velocity of 0.36 m/sec. There is a cushion of fluid 1.8 mm thick between the plane and the plate. Find the viscosity of the fluid if the weight of the plate is 280 N. [8+8]
8. (a) List all hydraulic losses, Mechanical losses and Leakage losses of a centrifugal pump. Explain when can centrifugal pumps be arranged in series and in parallel.
- (b) How can you find the power required to drive a reciprocating pump? Define slip of a reciprocating pump. [8+8]

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R05**Set No. 1**

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- (b) The head and discharge of a hydro electric plant are 28m and $330\text{m}^3/\text{sec}$ respectively. The installed turbine works with an efficiency of 86%. Find the power developed. [10+6]
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