

Scheme – I
Sample Question Paper

Program Name : Diploma in Mechanical Engineering
Program Code : ME
Semester : Fourth
Course Title : Fluid Mechanics and Machinery
Marks : 70

22445

Time: 3 Hrs.

Instructions:

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

Q.1) Attempt any FIVE of the following.

10 Marks

- a) List different Properties of fluid
- b) Convert the following reading on pressure gauge (i) -30 mm of Hg into KPa.
- c) List out the discharge measuring instrument.
- d) State the various minor losses in the pipe.
- e) State factors which govern selection of turbine for hydraulic electric power plant
- f) State the applications of Centrifugal pump. (any two)

Q.2) Attempt any THREE of the following.

12 Marks

- a) A different pressure gauges shows following sets of reading (i) 50 psi (ii) 100 kg_f/cm² (iii) 15 bar Convert it into N/mm² & N/m².
- b) Compare physical properties of water with kerosene at atmospheric condition on the basis of (i) Specific Gravity (ii) Kinematic Viscosity (iii) Surface Tension (mention values)
- c) Explain pressure & velocity variation in convergent tube, throat and divergent tube of venturimeter.
- d) Explain with neat sketch procedure to calculate velocity using pitot tube.

Q.3) Attempt any THREE of the following.

12 Marks

- a) Interpret whether the laminar or turbulent flow in following situation
 - (i) Viscous liquid like oil travelling on smooth surface
 - (ii) Viscous liquid like Honey travelling on smooth surface

- (iii) Municipal tap water at high pressure
- b) Explain the phenomenon of “water hammer” in pipes also explain the procedure of reducing its effect..
- c) A reservoir built 4 km away from town has to supply water at the rate of 1000 lit/min. Calculate the size of supply pipe, if the loss of head due to friction and others in pipe is 20m. Assume coefficient of friction as 0.008.
- d) Draw inlet & outlet velocity diagram of impact of Jet when jet strikes tangentially at one of tips on moving curved vanes.
- e) A Jet of water strikes on series of cup shaped vanes which deflects through 165° . If the velocity of jet is that corresponding to head of 40 m & velocity of vanes is such that efficiency is maximum. Find the work done on vane per kg of water.

Q.4) Attempt any THREE of the following.

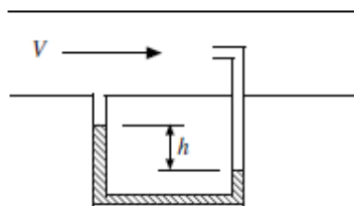
12 Marks

- a) State name of turbine for following conditions
 - (i) High speed & minimum discharge
 - (ii) Minimum discharge high head
 - (iii) Moderate discharge & head
 - (iv) Maximum discharge & Low head.
- b) State different types of draft tube used in the reaction turbine.
- c) Draw a characteristics curve of pelton turbine showing part load performance.
- d) Define the following w.r.t centrifugal pump
 - (i) Manometric head (ii)) Manometric efficiency
- e) Explain the construction & working of submersible pump with neat sketch

Q.5) Attempt any TWO of the following.

12 Marks

- (a) Determine the velocity V in the pipe if the fluid in the pipe of Figure shown is:



- (a) Atmospheric air and $h = 10$ cm of water
- (b) Water and $h = 10$ cm of mercury
- (c) Kerosene and $h = 20$ cm of mercury
- (d) Gasoline and $h = 40$ cm of water

- (b) A pipe of diameter 340 mm & length 4000m is used for transmission of power by water. The total head of inlet of pipe is 600m. Find maximum power available at the outlet of pipe (take $f=0.006$)
- (c) Draw a neat sketch of impact of jet on inclined fixed plate & write formula for various forces exerted on it.

Q.6) Attempt any TWO of the following.

12 Marks

- a) Draw the velocity diagram of pelton turbine & state relation for work done, power & efficiency
- b) Draw an Indicator diagram of reciprocating pump showing the effect of acceleration head & friction head on suction & delivery pipe.
- c) A Centrifugal pump has an impeller of outer diameter 30cm. The vane tips are radial at the outlet. For rotative speed of 1450 rpm, calculate net head developed. Also draw outlet velocity triangle. Assume manometric efficiency 82%.

Scheme – I
Question Paper Profile

Program Name : Diploma in Mechanical Engineering
Program Code : ME
Semester : Fourth
Course Title : Fluid Mechanics and Machinery
Marks : 20

22445

Time: 1 Hour

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Q.1 Attempt any FOUR.

08 Marks

- a) Define Fluid.
- b) State SI units of (i) Dynamic Viscosity (ii) Surface Tension (iii) Compressibility
- c) State the different types of fluid flow.
- d) State Continuity equation and explain meaning of each term for incompressible flow.
- e) Define Hydraulic Gradient Line (HGL) & Total Energy Line (TEL).

Q.2 Attempt any THREE.

12 Marks

- a) Differentiate between (i) Adhesion & Cohesion (ii) Dynamic Viscosity & Kinematic Viscosity
- b) Compare physical properties of water with kerosene at atmospheric condition on the basis of (i) Specific Gravity (ii) Kinematic Viscosity (mention values)
- c) A venturimeter has an area ratio 9:1. The large diameter being 300 mm. During the flow, the recorded pressure head in the large section is 6.5 m & that at the throat is 4.25m. The meter coefficient ($C=0.99$).
- d) Determine the velocity V in the pipe if the fluid in the pipe of Figure No.1 shown is:
 - (i) Atmospheric air and $h = 40$ cm of water
 - (ii) Water and $h = 20$ cm of mercury
 - (iii) Kerosene and $h = 30$ cm of mercury
 - (iv) Gasoline and $h = 80$ cm of water

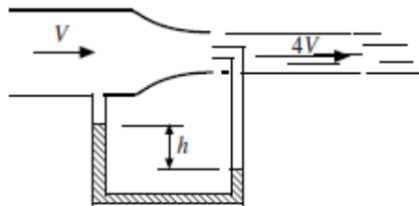


Figure 1

- e) A pipe of diameter 340 mm & length 4000m is used for transmission of power by water. The total head of inlet of pipe is 600m. Find maximum power available at the outlet of pipe (take $f=0.006$).

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Q.1 Attempt any FOUR.

08 Marks

- a) State the formula for force exerted by a jet on flat vertical plate moving in the direction of Jet
- b) Define (i) Hydraulic efficiency (ii) Mechanical efficiency w.r.t. turbines
- c) State the functions of Surge tank in hydraulic turbine
- d) State application of single acting & double acting reciprocating pump.
- e) State different types of casing used in centrifugal pump.

Q.2 Attempt any THREE.

12 Marks

- a) Draw a neat sketch of impact of jet on inclined fixed plate & write formula for various forces exerted on it
- b) Explain the concept of cavitation in the turbines
- c) Draw a characteristics curve of pelton turbine showing part load performance
- d) Explain meaning of term NPSH w.r.t. centrifugal pump
- e) A centrifugal pump having outer diameter equal to two times inner diameter & running at 1000 rpm works against a total head of 40m. The velocity of flow through impeller is constant & equal to 2.5m/sec. The vanes are 40° and set backward. If the outer diameter of impeller is 500mm & width at outlet 50mm. Determine (i) vane angle at inle (ii) Workdone by impeller on water per second
- f) Explain the construction & working of multistage pump with neat sketch.
