

22445

22223

3 Hours / 70 Marks

Seat No.

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- Instructions* –
- (1) All Questions are *Compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

- 1. Attempt any FIVE of the following: **10****
- a) Define viscosity and viscosity index.
 - b) Convert 3.2 bar pressure into equivalent mercury column.
 - c) State the types of fluid flow.
 - d) Define water hammer effect.
 - e) State laws of fluid friction for laminar flow.
 - f) Define draft tube and name any two types of draft tube.
 - g) Define for centrifugal pump
 - i) NPSH
 - ii) Manometric efficiency

P.T.O.

- 2. Attempt any THREE of the following:** **12**
- a) Explain simple U-tube differential manometer with neat sketch.
 - b) The circular plate of 1.6 m diameter is emersed vertically in a water such that it's centre is 4 m below the free water surface. Find depth of centre of pressure and total pressure.
 - c) Describe with neat sketch, construction and working principle of orificemeter.
 - d) Explain the various energees passeded by a flowing fluid.
- 3. Attempt any THREE of the following:** **12**
- a) Calculate the velocity at the end of the pipe of diameter 160 mm and 210 mm connected in series having discharge of 50 lit/min.
 - b) Write short notes on hydraulic power transmission through pipes.
 - c) The reservoir built 6 km away from town has to supply water at the rate of 800 lit/min. Calculate the size of supply pipe if the head loss due to friction and others in pipe is 20 m. Take coefficient of friction is 0.008.
 - d) Find equation for force and work done for the impact of jet on moving vertical plate.
 - e) A jet of water 15 cm diameter strike on a flat plate with velocity of 20 m/sec The plate is moving with a velocity of 9m/sec in the direction of jet and away from the jet. Find the efficiency of jet.

4. Attempt any THREE of the following: **12**

- a) Explain general layout of hydraulic power plant.
- b) State function of draft tube in reaction turbine. Explain any one in detail.
- c) A pelton wheel is having a mean bucket diameter of 1.5 m and is running at 800 r.p.m. The net head on pelton wheel is 700 m. If jet gets deflected through an angle of 165° and discharge through nozzle is $0.1\text{m}^3/\text{sec}$.

Find

- i) Power available at the nozzle
 - ii) Hydraulic efficiency of turbine.
- d) Define the following terms with respect to centrifugal pump.
- i) Total head
 - ii) Manometric head
- e) State any three troubles shooting and their remedies commonly experienced during operation of centrifugal pump.

5. Attempt any TWO of the following: **12**

- a) An orifice meter with orifice diameter 20 cm is inserted in a pipe of 40 cm diameter. The pressure difference measured by a mercury oil differential manometer on the two side of the orifice meter gives a reading of 60 cm of mercury. Find the rate of flow of oil of specific gravity 0.9, when the coefficient of discharge of the meter is 0.64.
- b) Find maximum power that can be transmitted by power station through hydraulic pipe 4 Km long and 0.2 m diameter. The intensity of pressure available is 50 bars. Take $f = 0.0075$.
- c) Derive an expression for the force exerted by a jet of water on a moving inclined plate. Also draw the neat sketch. Also find work done.

6. Attempt any TWO of the following:**12**

- a) Explain with a neat sketch, the construction and working of pelton wheel.
 - b) A centrifugal pump works against 10 m at 800 rpm the vanes are curved back at an angle 30° to the tangent at outer periphery. The impeller diameter is 30 cm and has width 5 cm at outlet. Determine the discharge of manometric efficiency is 95%. Also determine power required to operate the pump if overall efficiency is 70%.
 - c) Compare centrifugal pump with reciprocating pump.
(at least six points)
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