TE (CIVIL) \ SEM V \ R-19 \ SH-22 \ 24.11.22

Extra

(3 Hours)   Total Marks 80

QP CODE: 10014233

Note :- 1. Q.No.1 is compulsory.
2. Attempt any three questions out of remaining five questions.
3. Assume any data if required stating clearly

Q.No.1   Solve any four questions out of following   **20**
(a) What is Impulse momentum principle. Show that the force exerted by the **[5]** jet on a stationary vertical plate in the direction of jet is $\rho a V^2$
(b) Draw the neat sketch of layout of hydroelectric power plant. **[5]**
(c) Define various efficiencies of Centrifugal Pump. **[5]**
(d) Differentiate between (i) Uniform flow and Non Uniform flow (ii) **[5]** Steady flow and Unsteady flow (iii) Sub critical, critical and super critical flow.
(e) Explain briefly Specific Energy Curve **[5]**

Q.No.2   (a) A jet of water of 30 mm diameter strikes a hinged square plate at its **[10]** centre with a velocity of 20 m/s. The plate is deflected through an angle of 20^0. Find the weight of plate. If the plate is not allowed to swing, what will be the force at the lower edge of the plate to keep plate in vertical position.
(b) Derive the expression for force exerted by a jet on stationary curved **[10]** plate, when the jet strikes the curved plate at the centre.

Q.No.3   (a) A Pelton wheel is to be designed for the head of 58 mt when running at **[10]** 190 r.p.m.. The Pelton wheel develops 95 kW shaft power. The velocity of the buckets is equal to 0.5 times the velocity of the jet. Overall efficiency is 85%. Take $C_v = 0.97$
(b) A Kaplan turbine develops 24000 kW power at an average head of 40 **[10]** meters. Assuming a speed ratio of 2, flow ratio of 0.6, diameter of boss equal to 0.32 times the diameter of runner and overall efficiency of 90%. Calculate the diameter, speed of the turbine

Q.No.4   (a) A centrifugal pump having outer diameter equal to two times inner **[10]** diameter and running at 1000 r.p.m.. Pumps works against a total head of 40 meter. The velocity of flow through the impeller is constant and equal to 2.4 m/s. The vanes are set back at an angle of 40^0 at outlet. If the outer diameter of the impeller is 500 mm and width at outlet is 50 mm, determine (i) Vane angle at inlet (ii) Work done by impeller on water per second (iii) manometric efficiency

(b) Explain briefly multistage centrifugal pump **[05]**
(c) Explain Hydraulic Press **[05]**

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Q.No.5   (a) Derive the conditions for most economical trapezoidal channel section.   **[10]**
          (b) Determine the diameter of circular sewer pipe which is laid at a slope of   **[10]**
          1 in 8100 and carries a discharge of 0.8 m³/sec when flowing half full. Take
          Manning's N as 0.020

Q.No.6.   (a) Derive the expression for Gradually Varied Flow.   **[10]**
          (b) Explain various type of bed slope in open channel.   **[5]**
          (c) The discharge of water through a rectangular channel of width 6 mt is 12   **[5]**
          m³/sec when depth of flow is 1.0 mt, Calculate : (i) Specific Energy (ii)
          Critical Depth and Critical velocity.

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