Vivekananda College of Engineering & Technology, Puttur
[A Unit of Vivekananda Vidyavardhaka Sangha Puttur ®]
Affiliated to VTU, Belagavi & Approved by AICTE New Delhi

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# CONTINUOUS INTERNAL EVALUATION - 3

| Dept:CV | Sem / Div: 4 | Sub:Applied Hydraulics | S Code: 18CV43 |
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| Date: 01/09/22 | Time:9.30-11.0am | Max Marks: 50 | Elective: N |

Note: Answer any 2 full questions, choosing one full question from each part.

| QN | | Questions | Marks | RBT | CO's |
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| | | **PART A** | | | |
| 1 | a | Explain with a neat sketch draw general layout of hydro power plant and explain different types of turbine | 7 | L2 | CO4 |
| | b | A pelton wheel is having a mean bucket diameter of 1m and is running at 999.9 rpm. The net head on the pelton wheel is 699m. If the side clearance angle is 15° and discharges through nozzle is 0.1$m^3$/s find: i) Power available at the nozzle ii) Hydraulic efficiency of the turbine. | 8 | L3 | CO4 |
| | c | A pelton wheel turbine has to be designed for a head of 60 m when running at 200rpm to develop 96kW power. Cv=0.98 u= 0.45 velocity of jet. $\eta_o$ = 85%. Determine discharge, diameter of runner, diameter of jets, number of buckets. Assume d = D/12 . | 10 | L2 | CO4 |
| | | **OR** | | | |
| 2 | a | What do you mean by gross head, net Head and efficiency of turbine? Explain the different types of the efficiencies of a turbine | 10 | L2 | CO4 |
| | b | The Penstock supplies water from a reservoir to the pelton wheel with a gross head of 500m. One third of gross head is lost in friction in the penstock.The rate of flow of water through the nozzle fitted at the end of penstock is 2 $m^3$/s.The angle of deflection of the jet is 165°. Determine the power given by the water to the runner and also hydraulic efficiency, take speed ratio as 0.45 and coefficient of velocity as 1. | 7 | L3 | CO4 |

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| | c | Explain the classifications of turbines with examples | 8 | L2 | CO4 |
| | | **PART B** | | | |
| 3 | a | Define draft tube. Explain its function. Draw the neat sketches of types of draft tubes | 7 | L2 | CO4 |
| | b | Define specific speed of a centrifugal pump. Derive an expression for the specific speed. | 8 | L2 | CO4 |
| | c | The following data is given for a Francis Turbine. Net head H= 60m, speed, N= 700rpm ; shaft power =294.3kW. $\eta_0$ =93%, flow ratio=0.20; breadth ratio n= 0.1 ; outer diameter of the runner=2 x inner diameter of runner. The thickness of vanes occupy 5% of circumferential area of the runner, velocity of flow is constant at inlet and outlet and discharge is radial at outlet. Determine i) Guide blade angle ii) Runner vane angles at inlet and outlet iii)diameter of the runner at inlet and outlet iv) width of wheel at inlet. | 10 | L3 | CO4 |
| | | **OR** | | | |
| 4 | a | Explain with a neat sketch the working of a inward flow reaction turbine (Francis turbine). | 7 | L2 | CO4 |
| | b | A Kaplan turbine runner is to be designed to develop 9100 kW. The net available head is 5.6m. If the speed ratio is 2.09,flow ratio is 0.68, overall efficiency is 86% and the diameter of the boss is 1/3 x diameter of the runner. Find the diameter of the runner, its speed and specific speed of the turbine. | 10 | L3 | CO4 |
| | c | Explain components and working of a centrifugal pump | 8 | L2 | CO4 |

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