

**Notification No: 530/2023**

**Dated: 17-02-2023**

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**Name of Topic: Investigation on Novel Processes in Flowing Medium Lasers using Customized Acquisition and Analysis System**

**Key Words: Data Acquisition and Analysis System, Lasers, Uncertainty, Size, weight and power (SWaP)**

## **FINDINGS**

This thesis dwells on the investigations on processes involved in flowing medium lasers using customized, hybrid, Portable and Remote Hybrid data acquisition and analysis system (DAAS) with a master-slave architecture. Developed DAAS has been verified by conducting several real time experiments with most potent and contemporary flowing medium lasers, Chemical Oxygen Iodine Laser (COIL) source with a flow rate of  $70 \text{ gs}^{-1}$  and Liquid Laser system both from close ranges and at line of sight remote distances of up to 80 m and nearly 35 m with obstacles.

Developed  $\text{I}_2$  (Iodine) supply system has potential to deliver Iodine on demand with required flow rates and advantages of smaller specific size, weight and power (SWaP), reduced system readiness time and electrical power supply using DAAS system.

Developed DAAS system has been tested for its efficacy with a reliable detailed uncertainty evaluation and shown significant potential for true decision-making for realistic COIL laser operation. This evaluation also investigates fundamental variables and results in which variable has the greatest impact on the system performance.