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Departmental Seminar

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Seminar Title	: : Experimental Investigation of Solar Heat Pump Driven Liquid Desiccant Membrane Dehumidifier for Peanut Drying
Speaker	: Pediseti Kumar Sai Tejes (Roll No: 520me6005)
Supervisor	: Prof. Saurav Datta, PIC (Departmental Seminar)
Venue	: Seminar Room, Mechanical Engineering Department
Date and Time	: 19 Sep 2024 (10:00 AM)
Abstract	: This study presents the experimental investigation of a solar heat pump integrated with three fluid-operated hollow fiber membrane-based liquid desiccant dehumidifier for agricultural food product drying application. The prime focus of the present study is to decrease the drying time and to upsurge the drying rate to reduce post-harvest loss. The food product selected is peanut due to its need for low temperature drying (< 45°C). The dehumidifier module is made up of PVDF (polyvinylidene fluoride) membrane conduits with an additional water jacket around the shell and the liquid desiccant used is Lithium chloride (LiCl). The solar heat pump with water as working fluid is integrated to the dehumidification system for desiccant regeneration as well as to heat the dehumidified air for drying application. Further, a drying chamber is fabricated and insulated with glass wool consists of three perforated trays of equal spacing for proper air distribution. The performance indices considered are the drying efficiency ( $\eta_{dryer}$ ) and specific energy consumption (SEC). In the experimental study of the drying system, a parametric analysis is carried out, and observed a maximum SEC of 3 MJ/kg and $\eta_{dryer}$ of 61% at the optimal inlet condition. Furthermore, a comparative analysis has been carried out between conventional and proposed drying methods and observed that SEC is decreases by 33% and $\eta_{dryer}$ increases by 36%. The obtained results conclude that the system can be efficiently utilized for peanuts and other low-temperature agricultural drying applications.