Department of Mechanical Engineering
NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA, SURATHKAL

Ref. No. 1944/NITK/ANRF/MECH/ASB/2024-25/A9 **05/05/2025**

Advertisement for Summer Internship

Applications are invited for the position of Summer Intern in a research and development project **(ANRF -CRG**) with following details:

Title of the project:

"Investigation into the effect of water on the boiling heat transfer coefficient of $NH_3/LiNO_3$ mixture"

Principal Investigator:

Dr. A. Sathyabhama,
Professor, Department of Mechanical Engineering,
National Institute of Technology Karnataka, Surathkal, Mangalore-575025,
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Co-Principal Investigators:

Dr. Ramakrishna N. Hegde,
Professor, Department of Automobile Engg.,
Srinivas Institute of Technology, Valachil,
Merlapadavu, Farangipete, Mangalore 574143

Name of the position: Summer Intern

No. of Positions/Vacancies: Two

Qualifications:
Essential Qualifications: - Candidate studying in Prefinal year or final year **B.E./B.Tech** in Mechanical Engineering or other allied disciplines relevant to the topic with a minimum of 60% aggregate score (6.5/10 CGPA).

Desired Skills: -

- Basic exposure to software such as ANSYS, ASPEN and have good knowledge of Ammonia refrigeration system.
- Ability to work in a team, good communication skills and experience in experimental research for fabrication of setup.

Age Limit: - 25 years (Preferrable)

Salary: -

- **Rs. 5,000/month**

Duration: 01 Months

How to apply: Interested candidates must apply with the following documents (1) Cover letter (2) Application form as per the attached format with passport-sized photograph, (3) Scanned copies of educational certificates and mark sheets, class X onwards.

The soft copies of all the above documents (pdf format) must be **emailed to the P.I., Dr. A. Sathyabhama, (sathyabhama@nitk.edu.in) by 19th May 2025**. Only shortlisted candidates will be intimated by email and called for **Offline interview**. The position is available immediately. The appointment will be on a purely temporary basis co-terminus with the project.

About the project:

Total Project duration: 3 YEARS (2024-2027)

Funding Agency: Anusandhan National Research Foundation (ANRF)

Project summary:

Absorption refrigeration systems (ARS) play an important role in energy saving and pollution reduction as they use low-grade energy such as waste heat and solar energy to produce cooling effect and use environmentally friendly refrigerants like water and ammonia. Several research works have demonstrated that exhaust gas of internal combustion engines, exhaust heat of fishing vessels, and industrial waste heat can be considered as heat sources for ARS. But to compete with vapour compression refrigeration system, size of the ARS should be reduced and the coefficient of performance (COP) should be improved. Recent research works propose the use of $NH_3/LiNO_3$ mixture as the working fluid to achieve these goals. Elimination of rectifier makes $NH_3/LiNO_3$ ARS suitable for small scale applications, such as automobile refrigeration unit using exhaust heat as input energy. Low operating temperature in the generator makes it a viable option for solar cooling. Theoretical simulations on $NH_3/LiNO_3$ ARS have proved that it can achieve evaporator temperature below 0°C, which manifest its use in the freezing applications. But the experimental results did not match the theoretical findings because of higher viscosity of $NH_3/LiNO_3$ solution. Thus, in order to reduce the viscosity, it was proposed to add suitable amount of water to the binary solution $NH_3/LiNO_3$ solution. The thermophysical properties of ternary namely, solubility, viscosity, density, vapour pressure heat capacity, vapour liquid equilibrium, thermal conductivity are available in literature. There are reports on the theoretical simulation and experimental investigation of ARS with $NH_3/(LiNO_3+H_2O)$ solution as working fluid. However, literature on boiling heat transfer coefficient (BHTC) and pressure drop of this mixture is very limited. Hence the present study focuses on measurement of BHTC and pressure drop of $NH_3/(LiNO_3+H_2O)$ mixture at different water mass fractions. The experiments will be conducted with plate heat exchanger (PHE) as the generator of the ARS. Effect of various parameters such as heat flux, mass flux, water mass fraction, vapour fraction on BHTC and pressure drop will be evaluated.