Proposal for announcing seat under the Institute Internship Program

(separate form to be filled for seat under Institute funding and project funding)

1. Name of faculty member proposing: Dr. Nisha Verma
2. Department/Centre: Materials Research Centre
3. Topic on which work is proposed: Finite Element Method (FEM) analysis to evaluate temperature and stress distribution during the process of spark plasma sintering

4. Preferred period of internship (after May 20th): Between _20th May____2024 to _19th July___2024

5. Qualification of student (branch/semester of study): Pursuing BE/B.Tech or M.Tech in Mechanical Engineering or allied subjects with background and interest in Mechanical Behaviour of Materials, Finite Element Methods.

6. Brief description of work (300-500 words): A comprehensive finite element model (FEM) incorporating thermal, electrical, and mechanical coupling will be created to analyze temperature and stress distribution in the spark plasma sintering (SPS) process. The model will also incorporate real densification behavior through the moving mesh technique. Simulation studies will be carried out using COMSOL, considering various die sizes, heating rates, and uniaxial stresses. Experimental results will then be used to validate the simulation findings.

7. Expected learning of student (upto 100 words): Mastering the foundational principles of formulation techniques in the Finite Element Method (FEM) is essential for students' future research pursuits. This entails grasping the utility and characteristics of Finite Element Analysis (FEA) elements, such as bars, beams, plane elements, and iso-parametric elements. With this knowledge, students can conduct thorough analysis and optimization of intricate engineering challenges. Proficiency in FEM software enhances their skill sets, rendering them invaluable for future research endeavors and employment opportunities.

8. Nature of work: (Experimental/**simulation**/mathematical modelling/data collection-analysis etc.): upto 50 words: The project entails developing a Finite Element Method (FEM) model utilizing the COMSOL Multiphysics Software package, which integrates Thermal-Electrical-Mechanical coupling. Following this, simulations will be conducted to examine the temperature distribution within ceramic materials during field-assisted sintering, with particular attention to variations based on die dimension.

9. If the seat is under project sponsored category: **No**
   a) If yes, number of seats announced:
   b) Name and ID no. of project from which stipend is chargeable

Nisha

Signature of faculty member

Name of department/Centre

Material Research Centre

Note:

a) Proposing faculty member needs to be available at the Institute during the period internship is offered
b) No extra space or funding than the stipend will be provided by the institute for this purpose