

DECLARATION BY THE CANDIDATE

I, MANISH KUMAR SINGH certify that the work embodied in this thesis is my own bona-fide work and carried out by me under the supervision of Professor R.K.Mandal from September-2012 to November-2018, at the Department of Metallurgical Engineering, Indian Institute of Technology (Banaras Hindu University) Varanasi. The matter embodied in this thesis has not been submitted for the award of any other degree/diploma. I declare that I have faithfully acknowledged and given credits to the research workers wherever their works have been cited in my work in this thesis. I further declare that I have not willfully copied any other's work, paragraphs, text, data, results, *etc.*, reported in journals, books, magazines, reports dissertations, theses, *etc.*, or available at websites and have not included them in this thesis or cited as my own work.

Date :

Signature of the Student

Place :

(MANISH KUMAR SINGH)

CERTIFICATE BY THE SUPERVISOR

It is certified that the above statement made by the student is correct to the best of my knowledge.

Signature of Supervisor

(Professor R.K.Mandal)

Signature of Head of Department