

## Certificate

The work included in the thesis entitled “**Light harvesting enhancement of photoanode in dye sensitized solar cells using mesoporous silica and plasmonic silver nanoparticles**” submitted to the Faculty of Sciences, Guru Nanak Dev University, Amritsar, for the degree of **Doctor of Philosophy** was carried out by Mrs Tanvi at the Department of Physics, Guru Nanak Dev University, Amritsar, under my supervision. This is an original work and has not been submitted in part or full for any other degree/diploma at this or any other university/institute. This thesis is fit to be considered for the award of the degree of Ph.D.

**Supervisor**

**Dr. Aman Mahajan**

**Assistant Professor**

**Department of Physics**

**Co-supervisor**

**Dr. Subodh kumar**

**Professor**

**Department of Chemistry**

**Dated:**