CERTIFICATE

This is to certify that the dissertation title ***"Design of Minkowski Fractal Antenna"*** is the authentic work of **Mr. Munish Gupta** under my guidance and supervision in the partial fulfillment of requirement towards the degree of Master of Technology in ***Microwave and Optical Communication***, jointly run by the Department of Electronics and Communication Engineering and Department of Applied Physics at ***Delhi Technological University, New Delhi.*** To the best of my knowledge, the matter embodied in the thesis has not been submitted to any other University/ Institute for the award of any other degree.

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DECLARATION

I, Munish Gupta, ROLL No. 2K12/MOC/09 student of M.Tech (Microwave & Optical Communication) , hereby declare that all the information in these documents has been obtained and presented in accordance with academic rules and ethical conduct. It is being submitted for the degree of Master of Technology in Microwave and Optical Communication at Delhi Technological University. It has not been submitted before for any degree or examination in any other university.

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With all praises to the almighty and by His blessings I have finally completed this thesis.

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ABSTRACT

Communication between humans was first by sound through voice. With the desire for slightly more distance communication came, devices such as drums, then, visual methods such as signal flags and smoke signals were used. These optical communication devices, of course, utilized the light portion of the electromagnetic spectrum. It has been only very recent in human history that the electromagnetic spectrum, outside the visible region, has been employed for communication, through the use of radio. One of humankind's greatest natural resources is the electromagnetic spectrum and the antenna has been instrumental in harnessing this resource.. Nowadays wireless communications systems (GSM/UMTS/WIFI) require compact antennas which are small in size and also capable of operating at different bands. Fractal geometry antennas are studied in order to answer those requirements. Recent studies show that the fractal structures have their own specific characteristics that improve certain properties of antenna (when talking about low profile antennas). Fractal antenna is comprised of elements patterned after self-similar designs. Self-similarity of the fractal shape can be translated into its electromagnetic behaviour. Fractal antennas are very old in concept and very new in design for broadband applications. Many discontinuities in the structure aid in radiating higher frequencies. Both miniaturization and broadband coverage are the greatly achievable factors in this type. This thesis covers basically two aspects. First is the design of a square patch antenna radiating in L-band at around 1.32GHz and then using this square patch antenna as basic structure for developing first three order of Minkowski fractal antenna and which leads to the result that shows multiband characteristics of these fractal antennas radiating from L-band to S-band.

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