

**VISVESWARAIAH TECHNOLOGICAL UNIVERSITY
BELGAUM-590014**



A Dissertation Report on
“MASONRY DOME IN THE FORM OF AN ELLIPSOID”

[Project funded by ‘Karnataka state council for science and technology’ (KSCST)]

Submitted in partial fulfillment of the requirements for the award of the degree

**MASTER OF TECHNOLOGY
IN
STRUCTURAL ENGINEERING**

Submitted By

**AVINASH DESHPANDE
(USN: 1RV09CSE02)**

Under the guidance of

DR. K. S. JAGADISH
Professor of P.G. studies
Dept. of Civil Engineering
R.V.C.E, Bengaluru.

Mr. MANJUNATH. S
Assistant Professor
Dept. of Civil Engineering
R.V.C.E, Bengaluru.

Carried out at



2010-2011

**DEPARTMENT OF CIVIL ENGINEERING
RASHTREEYA VIDYALAYA COLLEGE OF ENGINEERING
R.V. VIDYANIKETAN POST, BENGALURU-560059**

ABSTRACT

It is well known that spherical domes of masonry can be constructed without the use of formwork. The technique involves using a rod or a thread from the centre of the sphere to describe the spherical surface where the length of the rod is being equal to radius of the sphere. This concept is mainly useful to cover rooms, which are either circular or square in plan. However if a room is rectangular in plan, this concept cannot be used.

When a room is rectangular the ideal shape of a dome in plan will be an ellipse with major and minor axis being equal to sides of a rectangle. It is also well known that any ellipse can be drawn using a thread of constant length but fixed from two points. The locus of points describing the ellipse will be obtained when a point on the thread is moved along the ellipse.

A masonry dome with major axis of 4m and minor axis of 3m length and a height of 1.5m was constructed using table moulded in 1:4 cement mortar. The dome was tested with the help of sand bag loading after 28 days of curing. The load was applied as uniformly distributed load over the dome for a portion of half the height of the dome around the crown. The deflection at the crown and strains at critical points were measured. The dome was also analyzed for the stresses developed using approximate membrane analysis. The ellipsoidal masonry dome constructed in this study proved to withstand safe for the working loads and twice the working loads when loaded uniformly over half the height of dome around the crown. No cracks were observed in the dome when loaded for working and twice the working loads.

Keywords: Ellipsoidal dome, Brick masonry, Stresses and strains.