VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"Jnana Sangama" Belagavi – 590 010

PROJECT REPORT
ON
"MODELLING OF NOTCH FILTER USING WHISPERING GALLERY MODE RESONATOR"

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

BACHELOR OF ENGINEERING
IN
ELECTRONICS & COMMUNICATION ENGINEERING

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CERTIFICATE

Certified that the project work entitled "**MODELLING OF NOTCH FILTER USING WHISPERING GALLERY MODE RESONATOR**" *is a bonafide work carried out by*

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in partial fulfillment for the award of BACHELOR OF ENGINEERING in **ELECTRONICS & COMMUNICATION ENGINEERING** of the **VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI** during the year 2018-2019. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of Project work prescribed for the Bachelor of Engineering Degree.

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ABSTRACT

The whispering-gallery mode of resonance with high-permittivity dielectric resonators appears to be mostly useful in the millimeter wave region, where more conventional dielectric resonators are impractically small. High order whispering gallery (WG) mode Dielectric Resonators (DR's) are attractive for filter applications, since they can generally have a small size, and high Q's at high frequency. The band stop filter, also known as notch filter, passes all frequencies with the exception of those within a specified stop band which are greatly attenuated.

The proposed work describes a novel bandpass filter based on using Whispering Gallery (WG) modes in high-density dielectric resonators. Because of the high modal purity, this type of resonator will be useful as a filter element in the millimeter wave range of frequencies. Coupling schemes conventionally used with WG mode DR's include loop and a waveguide. In this approach, when the length of the ring waveguide is an integer number of wavelengths, the ring waveguide resonates to the wavelength and the power stored in the ring builds up leading to evanescent waves. This makes the ring resonator an ideal notch filter, blocking the signal at the resonant wavelength. The proposed notch filter shows almost zero transmittance at resonance. The proposed method demonstrates a notch filter with a narrow center frequency using COMSOL Multiphysics tool.