

**GENERALIZED THREE CLASSES OF MIXED TYPE DOUBLE  
BERNOULLI- GEGENBAUER-GOULD AND HOPPER  
POLYNOMIALS**

**M. A. Pathan and Hemant Kumar\***

Department of Mathematics,  
Aligarh Muslim University,  
Aligarh - 202002, Uttar Pradesh, INDIA

E-mail : mapathan@gmail.com

\*Department of Mathematics,  
D. A. V. Postgraduate College,  
Kanpur - 208001, Uttar Pradesh, INDIA

E-mail : palhemant2007@rediffmail.com

**(Received: Feb. 17, 2024 Accepted: Jul. 14, 2024 Published: Aug. 30, 2024)**

**Abstract:** In this article, we investigate a three classes of generalized mixed type double Bernoulli-Gegenbauer-Gould and Hopper (BGG-H) polynomials. Some special polynomials of the generalized mixed type Bernoulli-Gegenbauer polynomials are discussed to obtain certain results and relations of our double (BGG-H) polynomials in terms of known and unknown functions. Some inequalities and limiting cases of double (BGG-H) polynomials are presented and then on using them we construct a matrix representation and obtain integral estimates.

**Keywords and Phrases:** Bernoulli's polynomials, Gegenbauer polynomials, Gould and Hopper's polynomials, double Bernoulli-Gegenbauer-Gould and Hopper polynomials, matrix representations, integral estimates.

**2020 Mathematics Subject Classification:** 11B83, 11C08, 33B10, 33B99.

**1. Introduction, some special functions and their values**

Throughout this investigation, we consider two variables analogue of Gould and Hopper polynomials containing seven parameters given by  $m_1, m_2 \in \mathbb{Z}_+$ , (a set of