

**CERTAIN INTEGRATION INVOLVING HERMITE AND
GEGENBAUER POLYNOMIALS**

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(Received: Feb. 23, 2021 Accepted: May 24, 2021 Published: Jun. 30, 2021)

Abstract: The present paper deals with some Definite Integral comprising Hermite along with Gegenbauer polynomials in association with Hypergeometric function.

Keywords and Phrases: Pochhammer symbol, Hermite Polynomial, Hypergeometric Function, Gegenbauer polynomial.

2020 Mathematics Subject Classification: 33C05, 33C20, 33C45.

1. Introduction

In calculation, Pochhammer symbol is stated as [Steffensen p.8]

$$(z)_p = z(z-1)(z-2)\dots(z-p+1) = \prod_{t=1}^p (z-t+1) = \prod_{t=0}^{p-1} (z-t) \quad (1.1)$$

The Gegenbauer polynomial is defined as [Abramowitz & Stegun p. 561]

$$C_n^{(\lambda)}(z) = \frac{(2\lambda)_n}{n!} {}_2F_1\left(-n, 2\lambda+n; \lambda+\frac{1}{2}; \frac{1-z}{2}\right). \quad (1.2)$$

The expansion formula of Hermite polynomial is defined as [Poularikas p.437(22.1.2)]

$$H_m(t) = \sum_{p=0}^{[m/2]} \frac{(-1)^p m!}{p! (m-2p)!} (2t)^{m-2p}, \quad [m/2] = \text{largest integer} \leq m/2. \quad (1.3)$$