

## A STUDY OF INFINITE INTEGRALS INVOLVING GENERALIZED ASSOCIATED LEGENDRE FUNCTION

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### Abstract

In this paper, we first evaluate an infinite integral whose integrand is the factor  $z^{v-1}(z-1)^{-\mu}(z+1)^{-\rho}(a+bz^q)^{-\sigma}$ . Next we establish the second integral whose integrand involves the product of  $(\tau, \beta)$ -generalized associated Legendre function of first kind  ${}_{\tau, \beta} P_k^{m, n}(z)$ , general class of polynomials  $S_V^U[x]$ ,  $\overline{H}$ -function and multivariable  $H$ -function. On account of the most general nature of the functions occurring in the integrand of the second integral, our findings provides interesting unifications and extensions of a number of new and known integrals. For the sake of illustration, we obtain herein three new integrals involving the functions namely: Shively polynomials, Laguerre polynomials, Meixner polynomials, Hurwitz-Lerch zeta function,  $g_1$ -function, Gaussian Model free energy, generalized Mittag-Leffler function, Lorenzo Hartley function, generalized Hypergeometric function.

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Key Words and Phrases : *General class of polynomials, Generalized associated Legendre function of first kind,  $\overline{H}$ -function and multivariable  $H$ -function.*

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