South East Asian J. of Math. & Math. Sci. **ISSN : 0972-7752**
Vol.13, No.1 2017, pp. 27-46

A STUDY OF UNIFIED INTEGRALS INVOLVING THE GENERALIZED POLYNOMIAL SET, GENERALIZED LEGENDRE'S ASSOCIATED FUNCTION AND ALEPH (ℵ) FUNCTION WITH APPLICATIONS

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Abstract: In this Paper We evaluate three finite integrals involving the product of generalized sequence of function $S_n^{\mu,\delta,0}$, Generalized Legendre associated function $P_\gamma^{\alpha,\beta}(x)$ and Aleph (ℵ) function. Then we will demonstrate three theorems as an application of our results and future, to use the three results of Orr and Bailey found in the well-known text by Slater [7]. The study also aims to evaluate some new integrals by the applications of these theorems, which retain their general nature and also create an interest by the applications of these theorems.

Keywords: Generalized Sequence of function, Fractional Differential Operator, Aleph (ℵ)-function, General Class of Multivariable Polynomials and Generalized Legendre Associated function.

2010 Mathematics Subject Classification: 33C99, 33C60, 44A20.

1. Introduction

1.1. The Legendre Associated Function:

B. Meulenbeld [6], is defined and represents Generalized Legendre Associated function $P_\gamma^{\alpha,\beta}(x)$ as follows:

$$P_\gamma^{\alpha,\beta}(x) = \frac{(1+x)^{\frac{\beta}{2}}}{(1-x)^{\frac{\alpha}{2}}\Gamma(1-\alpha)}\ {}_2F_1\left\{\begin{array}{l}\gamma - \dfrac{\alpha-\beta}{2}+1, -\gamma - \dfrac{\alpha-\beta}{2} \\ \\ 1-\alpha;\end{array}\ ; \frac{1-x}{2}\right\}, \quad (1.1)$$

where α is non-positive integer and β, γ are unrestricted.
If We Put $\alpha = \beta$ in (1.1), then $P_\gamma^{\alpha,\beta}(x)$ becomes to the Associated Legendre