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NOVEL CLASS OF FINITE INTEGRALS INVOLVING GENERALISED HYPERGEOMETRIC FUNCTION

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Abstract: The classical summation theorems like Gauss theorem, Gauss second theorem, Bailey's theorem, Kummer's theorem, Watson theorem, Dixon theorem, Whipple's theorem and Saalshütz theorem respectively for the hypergeometric series ${}_2F_1$ and ${}_3F_2$ play a key role in the theory of hypergeometric and generalized hypergeometric series and are widely used in many fields. In this research paper, we wish to evaluate a new class of integrals consisting of twenty five results related to generalized hypergeometric function. These twenty five results are expressed in the single integral in the form :

$$\int_0^1 x^{d-1}(1-x)^{d+j-1}\,{}_4F_3\left[\begin{matrix} a,\ b,\ c,\ 2d+j \\ \frac{1}{2}(a+b+i+1),\ 2c+j,\ d \end{matrix};x\right]dx$$