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MELLIN AND LAPLACE TRANSFORMS INVOLVING THE PRODUCT OF EXTENDED GENERAL CLASS OF POLYNOMIALS AND I-FUNCTION OF TWO VARIABLES

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Abstract

The object of this paper is to establish Mellin and Laplace transform involving the product of extended general class of polynomials $S_{n,t}^{m}[x]$ and I-function of two variables. Some special cases have also been derived.

1. Introduction

Recently, The Mellin transform and Laplace transform of product of general class of polynomials with H-function of two variables [3 , 4] evaluated. In the present paper we establish the same transforms of I-function of two variables with extended general

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Key Words : *Mellin transforms, Laplace transform, Extended general class of polynomials and I-function of two variables.*

class of polynomials.

We shall utilized the following formulae in the present investigation. The I-function of one variable given by Rathie [5]

$$I_{p,q}^{m,n}\left[z\,\middle|\,\begin{array}{l}(a_j,\alpha_j;A_j)_{1,p}\\ \\ (b_j,\beta_j;B_j)_{1,q}\end{array}\right]=\frac{1}{2\pi}\int_L \phi(s)z^s ds \tag{1.1}$$

where

$$\phi(s)=\frac{\prod\limits_{j=1}^{m}\Gamma^{B_j}(b_j-\beta_j s)\prod\limits_{j=1}^{n}\Gamma^{A_j}(1-a_j+\alpha_j s)}{\prod\limits_{j=m+1}^{q}\Gamma^{B_j}(1-b_j+\beta_j s)\prod\limits_{j=n+1}^{p}\Gamma^{A_j}(a_j-\alpha_j s)}$$

Where A_j $(j=1,\cdots,p)$ and B_j $(j=1,\cdots,q)$ are not in general positive integers. Also

(i) $z\neq 0$

(ii) $i=\sqrt{-1}$

(iii) m,n,p,q are integers satisfying $0\leq m\leq q, 0\leq n\leq p$.

(iv) L is suitable contour in the complex plane.

(v) An empty product is interpreted as unity.

(vi) α_j $(j=1,\cdots,p)$; β_j $(j=1,\cdots,q)$; A_j $(j=1,\cdots,p)$ and B_j $(j=1,\cdots,q)$ are positive numbers.

(vii) a_j $(j=1,\cdots,p)$; b_j $(j=1,\cdots,q)$ are complex numbers such that no singularity of Γ^{B_j} $(b_j-\beta_j s)$, $(j=1,\cdots,m)$ coincides with any singularity of Γ^{A_j} $(1-a_j+\alpha_j s)$, $(j=1,\cdots,n)$. In general singularities are not poles.

The detailed conditions can be found in Rathie [5].

The I-function of two variables given by Shantha et. al. [6]

$$I[z_1,z_2]=I_{p_1,q_1;p_2,q_2;p_3,q_3}^{0,n_1:m_2,n_2;m_3,n_3}\left[\begin{array}{c}z_1\\ \\ z_1\end{array}\,\middle|\,\begin{array}{l}(a_j;\alpha_j,A_j;\xi_j)_{1,p_1}:(c_j,C_j;U_j)_{1,p_2};(e_j,E_j;P_j)_{1,p_3}\\ \\ (b_j;\beta_j,B_j;\eta_j)_{1,q_1}:(d_j,D_j;V_j)_{1,q_2};(f_j,F_j;Q_j)_{1,q_3}\end{array}\right]$$

$$=\frac{1}{2\pi i)^2}\int_{L_S}\int_{L_t}\phi(s,t)\theta_1(s)\theta_2(t)z_1^s z_2^t ds dt \tag{1.2}$$

where

$$\phi(s,t) = \frac{\prod_{j=1}^{n_1} \Gamma^{\xi_j}(1-a_j+\alpha_j s+A_j t)}{\prod_{j=n_1+1}^{p_1} \Gamma^{\xi_j}(a_j-\alpha_j s-A_j t) \prod_{j=1}^{q^1} \Gamma^{\eta_j}(1-b_j+\beta_j s+B_j t)}$$

$$\theta_1(s) = \frac{\prod_{j=1}^{n_2} \Gamma^{U_j}(1-c_j+C_j s) \prod_{j=1}^{m_2} \Gamma^{V_j}(d_j-D_j s)}{\prod_{j=n_2+1}^{p^1} \Gamma^{U_j}(c_j-C_j s) \prod_{j=m_2+1}^{q_2} \Gamma^{V_j}(1-d_j+D_j s)}$$

$$\theta_2(t) = \frac{\prod_{j=1}^{n_3} \Gamma^{P_j}(1-e_j+E_j t) \prod_{j=1}^{m_3} \Gamma^{Q_j}(f_j-F_j t)}{\prod_{j=n_3+1}^{p^3} \Gamma^{P_j}(e_j-E_j t) \prod_{j=m_3+1}^{q_3} \Gamma^{Q_j}(1-f_j+F_j t)}$$

where n_j, p_j, q_j $(j=1,2,3), m_j$ $(j=2,3)$ are non negative integers such that $0 \leq n_j \leq p_J, q_1 \geq 0$, $0 \leq m_j \leq q_j$ $(j=2,3)$ (not all zero simultaneously). α_j, A_j $(j=1,\cdots,p_1)$; β_j, B_j $(j=1,\cdots,q_1)$, C_j $(j=1,\cdots,p_2)$, D_j $(j=1,\cdots,q_2)$, E_j $(j=1,\cdots,p_3)$, F_j $(j=1,\cdots,q_3)$ are positive quantities. a_j $(j=1,\cdots,p_1)$, b_j $(j=1,\cdots,q_1)$, c_j $(j=1k,\cdots,p_2)$, d_j $(j=1,\cdots,q_2)$, e_j $(j=1,\cdots,p_3)$ and f_j $(j=1,\cdots,q_3)$ are complex numbers. The exponents $\xi_j, \eta_j, U_j, V_j, P_j, Q_j$ may take non integer values.
L_s and L_t are suitable contours of Mellin-Barnes type. More over, the contour L_s is in the complex s-plane and runs from $\sigma_1 - i\infty$ to $\sigma_1 + i\infty$ (σ_1 real), so that all the poles of Γ^{V_j} $(d_j - D_j s)$ $(j=1,\cdots,m_2)$ lie to the right of L_s and all poles of $\Gamma^{U_j}(1-c_j+C_j s)$ $(j=1,\cdots,n_2)$, $\Gamma^{\xi_j}(1-a_j+\alpha_j s+A_j t)$ $(j=1,\cdots,n_1)$ lie to the left of L_s. Similar conditions for L_t follows in complex t-plane. The detailed conditions of this function can be found in Shantha et. al.[6].
According Erdelyi [1, p.307]

$$\int_0^\infty x^{s-1}\left[\frac{1}{2\pi}\int_{c-i\infty}^{c+i\infty} g(s)x^{-s}ds\right]dx = g(s). \tag{1.3}$$

The extended general class of polynomials [2]

$$S_{n,t}^m[x] = \sum_{k=0}^{[n/m]} \frac{(-n)_{m,k}}{k!} A_{n+t,k} x^k, \quad n=0,1,2,\cdots; t=0,1,2,\cdots \tag{1.4}$$

where m is an arbitrary positive integer and the coefficients A_{n+t}, k $(n,k \geq 0)$ are arbitrary constants.

The Mellin transform of the function $f(x)$ is defined as

$$M\{f(x);s\} = \int_0^\infty x^{s-1} f(x)dx, \quad Re(s) > 0. \tag{1.5}$$

If Laplce transform of $f(t)$ is $F(p)$ and $G(s)$ is Mellin transform of $f(t)$, then

$$F(p= \sum_{s=0}^{\infty} \frac{(-p)^s}{s!} G(s+1). \tag{1.6}$$

2. Main Results

Theorem 2.1 : Prove that

$$M\left\{\left[S_{n,t}^{m}[ax^{\lambda}] I_{p_1,q_1:p_2,q_2;p_3,q_3}^{0,n_1:m_2,n_2;m_3,n_3}\left[\begin{matrix} z_1 x^{h_1} \\ z_2 x^{h_2}\end{matrix}\middle| \begin{matrix}(a_j;\alpha_j,A_j;\xi_j)_{1,p_1}:(c_j,C_j;U_j)_{1,p_2};(e_j,E_j;P_j)_{1,p_3} \\ (b_j;\beta_j,B_j;\eta_j)_{1,q_1}:(d_j,D_j;V_j)_{1,q_2};(f_j,F_j;Q_j)_{1,q_3}\end{matrix}\right]\right];s\right\}$$

$$= \frac{1}{h_2}\sum_{k=0}^{[n/m]} \frac{(-n)_{mk}}{k!} A_{n+t,k} a^k (z_2)^{-\left(\frac{s+\lambda k}{h_2}\right)} I_{p_1+p_2+p_3,q_1+q_2+q_3}^{m_2+m_3,\ n_1+n_2+n_3}\left[(z_2)^{\left(\frac{h_1}{h_2}\right)} z_1 \middle| \begin{matrix}(c_j,C_j;U_j)_{1,p_2}, \\ (d_j,D_j;V_j)_{1,q_2},\end{matrix}\right.$$

$$\left(e_j + E_j\left(\frac{s+\lambda k}{h_2}\right), -E_j\frac{h_1}{h_2};P_j\right)_{1,n_3}, \left(e_j + E_j\left(\frac{s+\lambda k}{h_2}\right), -E_j\frac{h_1}{h_2};P_j\right)_{n_3+1,p_3},$$

$$\left(f_j + F_j\left(\frac{s+\lambda k}{h_2}\right), -F_j\frac{h_1}{h_2};Q_j\right)_{1,m_3}, \left(f_j + F_j\left(\frac{s+\lambda k}{h_2}\right), -F_j\frac{h_1}{h_2};Q_j\right)_{n_3+1,q_3},$$

$$\left(a_j + A_j\left(\tfrac{s+\lambda k}{h_2}\right), \alpha_j - A_j\tfrac{h_1}{h_2};\xi_j\right)_{1,n_1}, \left(a_j + A_j\left(\tfrac{s+\lambda k}{h_2}\right), \alpha_j - A_j\tfrac{h_1}{h_2};\xi_j\right)_{n_1+1,p_1},$$

$$\left.\left(\beta_j + B_j\left(\tfrac{s+\lambda k}{h_2}\right), \beta_j - B_j\tfrac{h_1}{h_2};\eta_j\right)_{1,n_1}\right] \tag{2.1}$$

Provided $h_1 > 0$, $h_2 > 0$, λ, a are complex numbers

$$a_j - A_j\frac{h_1}{h_2} > 0, \quad j = 1,\cdots,p_1$$

$$\beta_j - B_j\frac{h_1}{h_2} > 0, \quad j = 1,\cdots,q_1$$

$$|arg\ z_1| < (1/2)\pi\Delta_1, \quad |arg\ z_2| < \pi\Delta_2$$

where

$$\Delta_1 = \sum_{j=n_1+1}^{p_1} \alpha_j\xi_j - \sum_{j=1}^{q_1}\beta_j\eta_j + \sum_{j=1}^{m_2} D_jV_j - \sum_{j=m_2+1}^{q_2} D_jV_j + \sum_{j=1}^{n_2} C_jU_j - \sum_{j=n_2+1}^{p_2} C_jU_j$$

$$\Delta_2=\sum_{j=n_1+1}^{p_1}A_j\zeta_j-\sum_{j=1}^{q_1}B_j\eta_j+\sum_{j=1}^{m_3}F_jQ_j-\sum_{j=m_2+1}^{q_3}F_jQ_j+\sum_{j=1}^{n_3}E_jP_j-\sum_{j=n_2+1}^{p_3}E_jP_j$$

Proof : To prove this theorem, take $f(x)$ as

$$S_{n,t}^{m}[ax^{\lambda}]I_{p_1,q_1:p_2,q_2;p_3,q_3}^{0,n_1:m_2,n_2;m_3,n_3}\left[\begin{array}{c|c} z_1x^{h_1} & (a_j;\alpha_j,A_j;\xi_j)_{1,p_1}:(c_j,C_j;U_j)_{1,p_2};(e_j,E_j;P_j)_{1,p_3} \\ z_2x^{h_2} & (b_j;\beta_j,B_j;\eta_j)_{1,q_1}:(d_j,D_j;V_j)_{1,q_2};(f_j,F_j;Q_j)_{1,q_3}\end{array}\right];$$

in (1.5). The expression becomes

$$M\left\{\left[S_{n,t}^{m}[ax^{\lambda}]I_{p_1,q_1:p_2,q_2;p_3,q_3}^{0,n_1:m_2,n_2;m_3,n_3}\left[\begin{array}{c|c} z_1x^{h_1} & (a_j;\alpha_j,A_j;\xi_j)_{1,p_1}:(c_j,C_j;U_j)_{1,p_2};(e_j,E_j;P_j)_{1,p_3} \\ z_2x^{h_2} & (b_j;\beta_j,B_j;\eta_j)_{1,q_1}:(d_j,D_j;V_j)_{1,q_2};(f_j,F_j;Q_j)_{1,q_3}\end{array}\right]\right];s\right\}$$

$$=\int_0^{\infty}x^{s-1}S_{n,t}^{m}[ax^{\lambda}]I_{p_1,q_1:p_2,q_2;p_3,q_3}^{0,n_1:m_2,n_2;m_3,n_3}\left[\begin{array}{c|c} z_1x^{h_1} & (a_j;\alpha_j,A_j;\xi_j)_{1,p_1}:(c_j,C_j;U_j)_{1,p_2};(e_j,E_j;P_j)_{1,p_3} \\ z_2x^{h_2} & (b_j;\beta_j,B_j;\eta_j)_{1,q_1}:(d_j,D_j;V_j)_{1,q_2};(f_j,F_j;Q_j)_{1,q_3}\end{array}\right]dx$$

Use (1.2) and (1.4) to represent extended general class of polynomials as series and integral form of I-function of two variables in the above integral, of two variables t_1 and t_2. Put $h_2t_2=-u$, we get

$$\sum_{k=0}^{[n/m]}\frac{(-n)_{mk}}{k!}A_{n+t,k}a^k\frac{1}{(2\pi)^2}\int_{L_1}\int_{L_2}\theta_1(t_1)\theta_2\left(\frac{-u}{h_2}\right)\phi\left(t_1,\frac{-u}{h_2}\right)z_1^{t_1}(z_2)-\frac{u}{h_2}x^{-u}x^{h_1t_1+\lambda k+s-1}\left(\frac{du}{h_2}\right)du_1dx.$$

Interchange the order of integration, we get

$$=\sum_{k=0}^{[n/m]}\frac{(-n)_{mk}}{k!}A_{n+t,k}a^k\frac{1}{h_2}\frac{1}{(2\pi i)}\int_{L_1}\theta_1(t_1)z_1^{t_1}\left\{\int_0^{\infty}x^{h_1t_1+\lambda k+s-1}\left[\frac{1}{2\pi i}\int_{L_2}\theta_2\left(\frac{-u}{h_2}\right)\phi\left(t_1,\frac{-u}{h_2}\right)(z_2)-\frac{u}{h_2}x^{-u}du\right]dx\right\}dt_1.$$

Use result (1.3) and (1.1) to get the result. Change of order of integration is justifiable due to convergence of integrals.

Theorem 2.2 : Prove that

$$L\left\{\left[S_{n,t}^{m}[ax^{\lambda}]I_{p_1,q_1:p_2,q_2;p_3,q_3}^{0,n_1:m_2,n_2;m_3,n_3}\left[\begin{array}{c|c} z_1 & (a_j;\alpha_j,A_j;\xi_j)_{1,p_1}:(c_j,C_j;U_j)_{1,p_2};(e_j,E_j;P_j)_{1,p_3} \\ z_2 & (b_j;\beta_j,B_j;\eta_j)_{1,q_1}:(d_j,D_j;V_j)_{1,q_2};(f_j,F_j;Q_j)_{1,q_3}\end{array}\right]\right];s\right\}$$

$$=\frac{1}{h_2}\sum_{s=0}^{\infty}\frac{(-p)^s}{s!}\sum_{k=0}^{[n/m]}\frac{(-n)_{mk}}{k!}A_{n+t,k}a^k(z_2)^{-\left(\frac{s+\lambda k+1}{h_2}\right)}I_{p_1+p_2+p_3,q_1+q_2+q_3}^{m_2+m_3,\ n_1+n_2+n_3}\left[(z_2)^{\left(\frac{h_1}{h_2}\right)}z_1\ \middle|\ \begin{array}{l}(c_j,C_j;U_j)_{1,p_2},\\ (d_j,D_j;V_j)_{1,q_2},\end{array}\right.$$

$$\left(e_j+E_j\left(\frac{s+\lambda k+1}{h_2}\right),-E_j\frac{h_1}{h_2};P_j\right)_{1,n_3},\left(e_j+E_j\left(\frac{s+\lambda k+1}{h_2}\right),-E_j\frac{h_1}{h_2};P_j\right)_{n_3+1,p_3},$$

$$\left(f_j+F_j\left(\frac{s+\lambda k+1}{h_2}\right),-F_j\frac{h_1}{h_2};Q_j\right)_{1,m_3},\left(f_j+F_j\left(\frac{s+\lambda k+1}{h_2}\right),-F_j\frac{h_1}{h_2};Q_j\right)_{n_3+1,q_3},$$

$$\left(a_j + A_j\left(\frac{s+\lambda k+1}{h_2}\right), \alpha_j - A_j\frac{h_1}{h_2}; \xi_j\right)_{1,n_1}, \left(a_j + A_j\left(\frac{s+\lambda k+1}{h_2}\right), \alpha_j - A_j\frac{h_1}{h_2}; \xi_j\right)_{n_1+1,p_1},$$
$$\left.\left(\beta_j + B_j\left(\frac{s+\lambda k+1}{h_2}\right), \beta_j - B_j\frac{h_1}{h_2}; \eta_j\right)_{1,n_1}\right] \tag{2.2}$$

Proof : Proof of above theorem can be easily obtain by using (1.6).

3. Special Cases

(i) Put $t = 0$ in (2.1) and (2.2), we get Mellin and Laplace transform of I-function of two variables with general class of polynomials $S_n^m[ax^\lambda]$.

(ii) Take $t = 0, \lambda = 0, a = 1$ in (2.1) and (2.2), we get Mellin and Laplace transform of I-function of two variables.

(iii) Choose $\xi_j = \eta_j = U_j = V_j = P_j = Q_j = 1$ and $t = 0$ in (2.1) and (2.2), we get Mellin and Laplace transform of H-function of two variables with general class of polynomials

$$M\left\{\left[S_n^m[ax^\lambda]H^{0,n_1:m_2,n_2;m_3,n_3}_{p_1,q_1:p_2,q_2;p_3,q_3}\left[\begin{array}{c} z_1 \\ z_2 \end{array}\middle| \begin{array}{l} (a_j;\alpha_j,A_j;1)_{1,p_1} : (c_j,C_j;1)_{1,p_2};(e_j,E_j;1)_{1,p_3} \\ (b_j;\beta_j,B_j;1)_{1,q_1} : (d_j,D_j;1)_{1,q_2};(f_j,F_j;1)_{1,q_3} \end{array}\right]\right];s\right\}$$
$$= \frac{1}{h_2}\sum_{k=0}^{[n/m]}\frac{(-n)_{mk}}{k!}A_{n,k}a^k(z_2)^{-\left(\frac{s+\lambda k}{h_2}\right)}H^{m_2+m_3,\ n_1+n_2+n_3}_{p_1+p_2+p_3,q_1+q_2+q_3}\left[(z_2)^{\left(\frac{h_1}{h_2}\right)}z_1 \middle| \begin{array}{l}(c_j,C_j)_{1,p_2}, \\ (d_j,D_j)_{1,q_2},\end{array}\right.$$
$$\left(e_j + E_j\left(\frac{s+\lambda k}{h_2}\right), -E_j\frac{h_1}{h_2}\right)_{1,n_3}, \left(e_j + E_j\left(\frac{s+\lambda k}{h_2}\right), -E_j\frac{h_1}{h_2}\right)_{n_3+1,p_3},$$
$$\left(a_j + A_j\left(\frac{s+\lambda k}{h_2}\right), \alpha_j - A_j\frac{h_1}{h_2}; \xi_j\right)_{1,n_1},$$
$$\left(f_j + F_j\left(\frac{s+\lambda k}{h_2}\right), -F_j\frac{h_1}{h_2}\right)_{1,m_3}, \left(f_j + F_j\left(\frac{s+\lambda k}{h_2}\right), -F_j\frac{h_1}{h_2}\right)_{m_3+1,q_3},$$
$$\left.\left(a_j + A_j\left(\frac{s+\lambda k}{h_2}\right), \alpha_j - A_j\frac{h_1}{h_2}\right)_{n_1+1,p_1}, \left(\beta_j + B_j\left(\frac{s+\lambda k}{h_2}\right), \beta_j - B_j\frac{h_1}{h_2}\right)_{1,n_1}\right] \tag{3.1}$$

$$L\left\{\left[S_{n,t}^m[ax^\lambda]H^{0,n_1:m_2,n_2;m_3,n_3}_{p_1,q_1:p_2,q_2;p_3,q_3}\left[\begin{array}{c} z_1x^{h_1} \\ z_2x^{h_2} \end{array}\middle| \begin{array}{l} (a_j;\alpha_j,A_j;1)_{1,p_1} : (c_j,C_j;1)_{1,p_2};(e_j,E_j;1)_{1,p_3} \\ (b_j;\beta_j,B_j;1)_{1,q_1} : (d_j,D_j;1)_{1,q_2};(f_j,F_j;1)_{1,q_3} \end{array}\right]\right];s\right\}$$
$$= \frac{1}{h_2}\sum_{s=0}^{\infty}\frac{(-p)^s}{s!}\sum_{k=0}^{[n/m]}\frac{(-n)_{mk}}{k!}A_{n,k}a^k(z_2)^{-\left(\frac{s+\lambda k+1}{h_2}\right)}H^{m_2+m_3,\ n_1+n_2+n_3}_{p_1+p_2+p_3,q_1+q_2+q_3}\left[(z_2)^{\left(\frac{h_1}{h_2}\right)}z_1 \middle| \begin{array}{l}(c_j,C_j)_{1,p_2}, \\ (d_j,D_j)_{1,q_2},\end{array}\right.$$

$$\left(e_j + E_j\left(\frac{s+\lambda k+1}{h_2}\right), -E_j\frac{h_1}{h_2}\right)_{1,n_3}, \left(e_j + E_j\left(\frac{s+\lambda k+1}{h_2}\right), -E_j\frac{h_1}{h_2}\right)_{n_3+1,p_3},$$

$$\left(a_j + A_j\left(\frac{s+\lambda k+1}{h_2}\right), \alpha_j - A_j\frac{h_1}{h_2}\right)_{1,n_1},$$

$$\left(f_j + F_j\left(\frac{s+\lambda k+1}{h_2}\right), -F_j\frac{h_1}{h_2}\right)_{1,m_3}, \left(f_j + F_j\left(\frac{s+\lambda k+1}{h_2}\right), -F_j\frac{h_1}{h_2}\right)_{n_3+1,q_3},$$

$$\left.\left(a_j + A_j\left(\tfrac{s+\lambda k+1}{h_2}\right), \alpha_j - A_j\tfrac{h_1}{h_2}\right)_{n_1+1,p_1}, \left(\beta_j + B_j\left(\tfrac{s+\lambda k+1}{h_2}\right), \beta_j - B_j\tfrac{h_1}{h_2}; \eta_j\right)_{1,n_1}\right] \tag{3.2}$$

(iv) Take $(\alpha_{p_1}) = (\beta_{q_1}) = (A_{p_1}) = (B_{q_1}) = (C_{p_2}) = (D_{q_2}) = (E_{p_3}) = (F_{q_3}) = 1$ in (3.1) and (3.2), we get Mellin and Laplace transform for G-function with general class of polynomials.

(v) Write $n_1 = p_1 = q_1 = 0$ and in (3.1) and (3.2), we get

$$M\left\{S_n^m[ax\lambda]H_{p_2,q_2}^{m_2,n_2}\left[z_1x^{h_1}\left|\begin{matrix}(c_j,C_j)_{1,p_2}\\ \\(d_j,D_j)_{1,q_2}\end{matrix}\right.\right]H_{p_3,q_3}^{m_3,n_3}\left[z_2x^{h_2}\left|\begin{matrix}(e_j,E_j)_{1,p_3}\\ \\(f_j,F_j)_{1,q_3}\end{matrix}\right.\right];s\right\}$$

$$= \frac{1}{h_2}\sum_{k=0}^{[n/m]}\frac{(-n)_{mk}}{k!}A_{n+t,k}a^k(z_2)^{-\left(\frac{s+\lambda k}{h_2}\right)}H_{p_2+p_3,q_2+q_3}^{m_2+m_3,\ n_2+n_3}\left[(z_2)^{-\left(\frac{h_1}{h_2}\right)}z_1\left|\begin{matrix}(c_j,C_j)_{1,p_2},\\ (d_j,D_j)_{1,q_2},\end{matrix}\right.\right.$$

$$\left.\begin{matrix}\left(e_j+E_j\left(\frac{s+\lambda k}{h_2}\right),-E_j\frac{h_1}{h_2}P_j\right)_{1,n_3},\left(e_j+E_j\left(\frac{s+\lambda k}{h_2}\right),-E_j\frac{h_1}{h_2}P_j\right)_{n_3+1,p_3},\\ \left(f_j+F_j\left(\frac{s+\lambda k}{h_2}\right),-F_j\frac{h_1}{h_2}Q_j\right)_{1,m_3},\left(f_j+F_j\left(\frac{s+\lambda k}{h_2}\right),-F_j\frac{h_1}{h_2}Q_j\right)_{n_3+1,q_3},\end{matrix}\right] \tag{3.3}$$

$$L\left\{\left[S_n^m[ax^\lambda]H_{p_2,q_2}^{m_2,n_2}\left[z_1x^{h_1}\ \middle|\ (c_j,C_j)_{1,p_2};(d_j,D_j;1)_{1,q_2}\right]H_{p_3,q_3}^{m_3,n_3}\left[z_2x^{h_1}\left|\begin{matrix}(e_j,E_j)_{1,p_3}\\ \\(f_j,F_j)_{1,q_3}\end{matrix}\right.\right];\right]s\right\}$$

$$= \frac{1}{h_2}\sum_{s=0}^{\infty}\frac{(-p)^s}{s!}\sum_{k=0}^{[n/m]}\frac{(-n)_{mk}}{k!}A_{n+t,k}a^k(z_2)^{-\left(\frac{s+\lambda k+1}{h_2}\right)}H_{p_2+p_3,q_2+q_3}^{m_2+m_3,\ n_2+n_3}\left[(z_2)^{\left(-\frac{h_1}{h_2}\right)}z_1\left|\begin{matrix}(c_j,C_j)_{1,p_2},\\ (d_j,D_j)_{1,q_2},\end{matrix}\right.\right.$$

$$\left.\begin{matrix}\left(e_j+E_j\left(\frac{s+\lambda k+1}{h_2}\right),-E_j\frac{h_1}{h_2}P_j\right)_{1,n_3},\left(e_j+E_j\left(\frac{s+\lambda k+1}{h_2}\right),-E_j\frac{h_1}{h_2}\right)_{n_3+1,p_3},\\ \left(f_j+F_j\left(\frac{s+\lambda k+1}{h_2}\right),-F_j\frac{h_1}{h_2}Q_j\right)_{1,m_3},\left(f_j+F_j\left(\frac{s+\lambda k+1}{h_2}\right),-F_j\frac{h_1}{h_2}Q_j\right)_{n_3+1,q_3}\end{matrix}\right] \tag{3.4}$$

4. Conclusion

On specialization of parameters in I-function of two variables, we get various special functions[7]. So, with results of this paper we get Mellin and Laplace transform or various special functions with extended general class of polynomials as special cases.

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