Websites:
http://www.jofamericanscience.org
http://www.sciencepub.net

Emails:
editor@sciencepub.net
sciencepub@gmail.com

Journal of American Science

MARSLAND PRESS
Multidisciplinary Academic Journal Publisher

Aboodh Transform Approach To Power Series

Dr. Dinesh Verma

Associate Professor, Yogananda College of Engineering & Technology, Jammu
Email: drdinesh.maths@gmail.com

Abstract: In Mathematics, a power series in one variable is an infinite series. In this paper, we will find the Aboodh Transform of some power series. The purpose of paper is to prove the applicability of Aboodh transform to some infinite power series.
[Dinesh Verma. **Aboodh Transform Approach To Power Series.** *J Am Sci* 2020;16(7):26-32]. ISSN 1545-1003 (print); ISSN 2375-7264 (online). http://www.jofamericanscience.org. 5. doi:10.7537/marsjas160720.05.

Keywords: Aboodh transformation, Power series.

1. Introduction

Aboodh transform is a mathematical tool used to obtain the solutions of differential equations without finding their general solutions [1-7]. It has applications in nearly all engineering disciplines [8-22]. It also comes out to be very effective tool to find the Aboodh Transform of some power series [23-36]. In this paper, we present Aboodh transform approach to find the Aboodh Transform of some power series.

2. Basic Definitions

A. 2.1 *Aboodh Transform*

If the function $h(y)$, $y \geq 0$ is having an exponential order and is a piecewise continuous function on any interval, then the Aboodh transform of $h(y)$ is given by

$$A\{h(y)\} = \bar{h}(p) = \frac{1}{p}\int_0^\infty e^{-py} h(y)dy.$$

The Aboodh Transform [1, 2, 3] of some of the functions are given by

- $A\{y^n\} = n!/p^{n+2}, where\ n = 0,1,2,..$
- $A\{e^{ay}\} = \frac{1}{p(p-a)},$
- $A\{sinay\} = \frac{a}{p(a^2+p^2)},$
- $A\{cosay\} = \frac{1}{a^2+p^2},$
- $A\{sinhay\} = \frac{a}{p(p^2-a^2)},$
- $A\{coshay\} = \frac{1}{p^2-a^2},$
- $A\{\delta(t)\} = 1/p$

The Inverse Aboodh Transform of some of the functions are given by

- $A^{-1}\{p^{n+2}\} = n!/y^n$
  $n = 0,1,2,3,4 ...$
- $A^{-1}\{\frac{1}{p(p-a)}\} = e^{ay}$
- $A^{-1}\{\frac{1}{p(a^2+p^2)}\} = \frac{1}{a}\sin ay$
- $A^{-1}\{cosay\} = \cos ay$
- $A^{-1}\{\frac{1}{p(p^2-a^2)}\} = \frac{1}{a}\sin hay$
- $A^{-1}\{\frac{1}{p^2-a^2}\} = \cos hay$

2.3 Power series [4, 5, 6,]:

$$\sum_{n=0}^{\infty} b_n z^n = b_0 + b_1 z + b_2 z^2 + \cdots b_n z^n$$

2.4 Maclaurin series [4, 5, 6,]:

$$y = \sum_{n=0}^{\infty} \frac{y^{(n)}}{n!} z^n = y_0 + \frac{y_0'}{1!} z + \frac{y_0''}{2!} z^2 + \frac{y_0'''}{2!} z^3 \dots\dots\dots$$

3. Methodology

3.1 Aboodh Transformation of Geometric Series later than the expanding to power series appearance [4, 5, 6,]:

$$\frac{1}{1-z} = \sum_{n=0}^{\infty} z^n = f(z)$$

$$A\{f(z)\} = A\left\{\sum_{n=0}^{\infty} z^n\right\}$$

$$= \frac{1}{p}\int_0^\infty e^{-pz} \sum_{n=0}^{\infty} z^n dz$$

$$= \sum_{n=0}^{\infty} \frac{1}{p}\int_0^\infty e^{-pz} z^n dz$$

$$=\sum_{n=0}^{\infty} A\{z^n\}$$

$$=\sum_{n=0}^{\infty}\frac{n!}{p^{n+2}}$$

Hence,

$$A\{f(z)\}=\sum_{n=0}^{\infty}\frac{n!}{p^{n+2}}$$

3.2 Aboodh Transformation of the Power series expansion of e^z later than the expanding to power series appearance [4, 5, 6,]:

$$e^z=\sum_{n=0}^{\infty}\frac{z^n}{n!}=f(z)$$

$$A\{f(z)\}=A\left\{\sum_{n=0}^{\infty}\frac{z^n}{n!}\right\}$$

$$=\frac{1}{p}\int_0^{\infty}e^{-pz}\left\{\sum_{n=0}^{\infty}\frac{z^n}{n!}\right\}dz$$

$$=\sum_{n=0}^{\infty}\frac{1}{p}\int_0^{\infty}e^{-pz}\frac{z^n}{n!}dz$$

$$=\sum_{n=0}^{\infty}\frac{1}{n!}\left[\frac{1}{p}\int_0^{\infty}e^{-pz}z^n dz\right]$$

$$=\sum_{n=0}^{\infty}\frac{1}{n!}A\{z^n\}=\sum_{n=0}^{\infty}\frac{1}{n!}\cdot\frac{n!}{p^{n+2}}$$

Hence, $A\{f(z)\}=\sum_{n=0}^{\infty}\frac{1}{p^{n+2}}$

3.3 Aboodh Transformation of the Power series expansion of $\log(1+z)$ later than the expanding to power series appearance [4, 5, 6,]:

$$\log(1+z)=\sum_{n=1}^{\infty}\frac{(-1)^{n+1}}{n}z^n=f(z)$$

$$A\{f(z)\}=A\left\{\sum_{n=1}^{\infty}\frac{(-1)^{n+1}}{n}z^n\right\}$$

$$=\frac{1}{p}\int_0^{\infty}e^{-pz}\left\{\sum_{n=1}^{\infty}\frac{(-1)^{n+1}}{n}z^n\right\}dz$$

$$=\sum_{n=1}^{\infty}\frac{1}{p}\int_0^{\infty}e^{-pz}\frac{(-1)^{n+1}}{n}z^n dz$$

$$=\sum_{n=1}^{\infty}\frac{(-1)^{n+1}}{n}\left[\frac{1}{p}\int_0^{\infty}e^{-pz}z^n dz\right]$$

$$=\sum_{n=1}^{\infty}\frac{(-1)^{n+1}}{n}A\{z^n\}$$

$$=\sum_{n=1}^{\infty}\frac{(-1)^{n+1}}{n}\frac{n!}{p^{n+2}}$$

$$=\sum_{n=1}^{\infty}(-1)^{n+1}\frac{(n-1)!}{p^{n+2}}$$

Hence,

$$A\{f(z)\}=\sum_{n=1}^{\infty}(-1)^{n+1}\frac{(n-1)!}{p^{n+2}}$$

3.4 Aboodh Transformation of the Power series expansion of $\log(1+z)$ later than the expanding to power series appearance [4, 5, 6,]:

$$\log(1+z)=\sum_{n=1}^{\infty}\frac{(-1)^{2n-1}}{n}z^n=f(z)$$

$$A\{f(z)\}=A\left\{\sum_{n=1}^{\infty}\frac{(-1)^{2n-1}}{n}z^n\right\}$$

$$=\frac{1}{p}\int_0^{\infty}e^{-pz}\left\{\sum_{n=1}^{\infty}\frac{(-1)^{2n-1}}{n}z^n\right\}dz$$

$$=\sum_{n=1}^{\infty}\frac{1}{p}\int_0^{\infty}e^{-pz}\frac{(-1)^{2n-1}}{n}z^n dz$$

$$=\sum_{n=1}^{\infty}\frac{(-1)^{2n-1}}{n}\frac{1}{p}\int_0^{\infty}e^{-pz}z^n dz$$

$$=\sum_{n=1}^{\infty}\frac{(-1)^{2n-1}}{n}A\{z^n\}$$

$$=\sum_{n=1}^{\infty}\frac{(-1)^{2n-1}}{n}\frac{n!}{p^{n+2}}$$

$$=\sum_{n=1}^{\infty}(-1)^{2n-1}\frac{(n-1)!}{p^{n+2}}$$

Hence,

$$A\{f(z)\}=\sum_{n=1}^{\infty}(-1)^{2n-1}\frac{(n-1)!}{p^{n+2}}$$

3.5 Aboodh Transformation of the Power series expansion of $\log\frac{(1+z)}{(1-z)}$ later than the expanding to power series appearance [4, 5, 6,]:

$$\log\frac{(1+z)}{(1-z)}=\sum_{n=1}^{\infty}\frac{2}{2n-1}z^{2n-1}=f(z)$$

$$A\{f(z)\}=A\left\{\sum_{n=1}^{\infty}\frac{2}{2n-1}z^{2n-1}\right\}$$

$$= \frac{1}{p}\int_0^\infty e^{-pz}\left\{\sum_{n=1}^{\infty}\frac{2}{2n-1}z^{2n-1}\right\}dz$$

$$= \sum_{n=1}^{\infty}\frac{1}{p}\int_0^\infty e^{-pz}\frac{2}{2n-1}z^{2n-1}dz$$

$$= \sum_{n=1}^{\infty}\frac{2}{2n-1}\left[\frac{1}{p}\int_0^\infty e^{-pz}z^{2n-1}dz\right]$$

$$= \sum_{n=1}^{\infty}\frac{2}{2n-1}A\{z^{2n-1}\}$$

$$= \sum_{n=1}^{\infty}\frac{2}{2n-1}\frac{(2n-1)!}{p^{2n-1+2}}$$

$$= \sum_{n=1}^{\infty}\frac{2(2n-2)!}{p^{2n+1}}$$

Hence,

$$A\{f(z)\} = \sum_{n=1}^{\infty}\frac{4(n-1)!}{p^{2n+1}}$$

3.6 Aboodh Transformation of the Power series expansion of $\cos x$ later than the expanding to power series appearance [4, 5, 6,]:

$$\cos x = \sum_{n=0}^{\infty}\frac{(-1)^n}{2n!}z^{2n} = f(z)$$

$$A\{F(z)\} = A\left\{\sum_{n=0}^{\infty}\frac{(-1)^n}{2n!}z^{2n}\right\}$$

$$= \frac{1}{p}\int_0^\infty e^{-pz}\left\{\sum_{n=0}^{\infty}\frac{(-1)^n}{2n!}z^{2n}\right\}dz$$

$$= \sum_{n=0}^{\infty}\frac{1}{p}\int_0^\infty e^{-pz}\frac{(-1)^n}{2n!}z^{2n}dz$$

$$= \sum_{n=0}^{\infty}\frac{(-1)^n}{2n!}\left[\frac{1}{p}\int_0^\infty e^{-pz}z^{2n}dz\right]$$

let $2n = u$

$$= \sum_{n=0}^{\infty}\frac{(-1)^n}{2n!}A\{z^u\}$$

$$= \sum_{n=0}^{\infty}\frac{(-1)^n}{2n!}\frac{u!}{p^{u+2}}$$

$$= \sum_{n=0}^{\infty}\frac{(-1)^n}{2n!}\frac{2n!}{p^{2n+2}}$$

$$\text{Hence, } A\{f(t)\} = \frac{(-1)^n}{p^{2n+2}}$$

3.7 Aboodh Transformation of the Power series expansion of $\sin x$ later than the expanding to power series appearance [4, 5, 6,]:

$$\sin x = \sum_{n=0}^{\infty}\frac{(-1)^n}{(2n+1)!}z^{2n+1} = f(z)$$

$$A\{f(z)\} = A\left\{\sum_{n=0}^{\infty}\frac{(-1)^n}{(2n+1)!}z^{2n+1}\right\}$$

$$= \frac{1}{p}\int_0^\infty e^{-pz}\left\{\sum_{n=0}^{\infty}\frac{(-1)^n}{(2n+1)!}z^{2n+1}\right\}dz$$

$$= \sum_{n=0}^{\infty}\frac{1}{p}\int_0^\infty e^{-pz}\frac{(-1)^n}{(2n+1)!}z^{2n+1}dz$$

$$= \sum_{n=0}^{\infty}\frac{(-1)^n}{(2n+1)!}\left[\frac{1}{p}\int_0^\infty e^{-pz}z^{2n+1}dz\right]$$

$$= \sum_{n=0}^{\infty}\frac{(-1)^n}{(2n+1)!}A\{z^{2n+1}\}$$

$$= \sum_{n=0}^{\infty}\frac{(-1)^n}{(2n+1)!}\frac{(2n+1)!}{p^{2n+1+2}}$$

$$\text{Hence, } A\{f(t)\} = \sum_{n=0}^{\infty}\frac{(-1)^n}{p^{2n+3}}$$

3.8 Aboodh Transformation of the Power series expansion of $\cosh x$ later than the expanding to power series appearance [4, 5, 6,]:

$$\cosh x = \sum_{n=0}^{\infty}\frac{1}{2n!}z^{2n} = f(z)$$

$$A\{f(z)\} = A\left\{\sum_{n=0}^{\infty}\frac{1}{2n!}z^{2n}\right\}$$

$$= \frac{1}{p}\int_0^\infty e^{-pz}\left\{\sum_{n=0}^{\infty}\frac{1}{2n!}z^{2n}\right\}dz$$

$$= \sum_{n=0}^{\infty}\frac{1}{p}\int_0^\infty e^{-pz}\frac{1}{2n!}z^{2n}dz$$

$$= \sum_{n=0}^{\infty}\frac{1}{2n!}\left[\frac{1}{p}\int_0^\infty e^{-pz}z^{2n}dz\right]$$

let $2n = u$

$$= \sum_{n=0}^{\infty}\frac{1}{2n!}A\{z^u\}$$

$$= \sum_{n=0}^{\infty}\frac{1}{2n!}\frac{u!}{p^{u+2}}$$

$$= \sum_{n=0}^{\infty} \frac{1}{2n!} \frac{2n!}{p^{2n+2}}$$

$$\text{Hence, } A\{f(t)\} = \sum_{n=0}^{\infty} \frac{1}{p^{2n+2}}$$

3.9 Aboodh Transformation of the Power series expansion of Sinx later than the expanding to power series appearance [4, 5, 6,]:

$$\text{Sinhx} = \sum_{n=0}^{\infty} \frac{1}{(2n+1)!} z^{2n+1} = f(z)$$

$$A\{f(z)\} = A\left\{\sum_{n=0}^{\infty} \frac{1}{(2n+1)!} z^{2n+1}\right\}$$

$$= \frac{1}{p}\int_0^{\infty} e^{-pz}\left\{\sum_{n=0}^{\infty} \frac{1}{(2n+1)!} z^{2n+1}\right\} dz$$

$$= \sum_{n=0}^{\infty} \frac{1}{p}\int_0^{\infty} e^{-pz} \frac{1}{(2n+1)!} z^{2n+1} dz$$

$$= \sum_{n=0}^{\infty} \frac{1}{(2n+1)!} \frac{1}{p}\int_0^{\infty} e^{-pz} z^{2n+1} dz$$

$$A\{f(z)\} = \sum_{n=0}^{\infty} \frac{1}{(2n+1)!} A\{z^{2n+1}\}$$

$$= \sum_{n=0}^{\infty} \frac{1}{(2n+1)!} \frac{(2n+1)!}{p^{2n+3}}$$

$$\text{Hence, } A\{f(t)\} = \sum_{n=0}^{\infty} \frac{1}{p^{2n+3}}$$

3.10 If f(z) is a power series expansion at thepoint b, where b is any constant, b ∈ R, Its Taylor'sseries expansion [5, 6]is

$$f(z) = \sum_{n=0}^{\infty} b_n (z-b)^n$$

Then, The Aboodh transformation of f(z) is given in the form of power series as

$$A\{f(z)\} = A\left[\sum_{n=0}^{\infty} b_n (z-b)^n\right]$$

$$= \frac{1}{p}\int_0^{\infty} e^{-pz}\left\{\sum_{n=0}^{\infty} b_n (z-b)^n\right\} dz$$

$$= \frac{1}{p}\sum_{n=0}^{\infty} b_n \int_0^{\infty} e^{-pz}\{(z-b)^n\} dz$$

$$= \frac{1}{p}\sum_{n=0}^{\infty} b_n \int_0^{\infty} e^{-p(b+u)}\{(u)^n\} dz$$

$$= \frac{1}{p}\sum_{n=0}^{\infty} b_n e^{-pb}\int_0^{\infty} e^{-up}\{(u)^n\} dz$$

$$= \sum_{n=0}^{\infty} b_n e^{-pb}\left[\frac{1}{p}\int_0^{\infty} e^{-up}\{(u)^n\} dz\right]$$

$$= \sum_{n=0}^{\infty} b_n e^{-pb} A(u)^n$$

$$A\left[\sum_{n=0}^{\infty} b_n (z-b)^n\right] = \sum_{n=0}^{\infty} b_n e^{-pb} \frac{n!}{p^{n+2}}$$

3.11 If f(z) is a power series expansion at thepoint 0, where 0, Its Power series expansion is[5, 6, 7,]:

$$f(z) = \sum_{n=0}^{\infty} b_n (z)^n$$

Then, The Aboodh transformation of f(z) is given in the form of power series as

$$A\{f(z)\} = A\left[\sum_{n=0}^{\infty} b_n (z)^n\right]$$

$$= \frac{1}{p}\int_0^{\infty} e^{-pz}\left\{\sum_{n=0}^{\infty} b_n (z)^n\right\} dz$$

$$= \frac{1}{p}\sum_{n=0}^{\infty} b_n \int_0^{\infty} e^{-pz}\{(z)^n\} dz$$

$$= \sum_{n=0}^{\infty} b_n \frac{1}{p}\int_0^{\infty} e^{-pz}\{(z)^n\} dz$$

$$= \sum_{n=0}^{\infty} b_n A(z)^n$$

$$A\left[\sum_{n=0}^{\infty} b_n (z)^n\right] = \sum_{n=0}^{\infty} b_n \frac{n!}{p^{n+2}}$$

3.12 Aboodh Transformation of the Power series expansion of e^{t^2} later than the expanding to power series appearance [5, 6, 7,]:

$$f(z) = e^{t^2} = \sum_{n=0}^{\infty} \frac{z^{2n}}{n!}$$

$$A[f(z)] = \frac{1}{p}\int_0^{\infty} e^{-pz}\left\{\sum_{n=0}^{\infty} \frac{z^{2n}}{n!}\right\} dz$$

$$= \frac{1}{p}\sum_{n=0}^{\infty} \frac{1}{n!}\int_0^{\infty} e^{-pz}\{(z)^{2n}\} dz$$

$$= \sum_{n=0}^{\infty} \frac{1}{n!}\left[\frac{1}{p}\int_0^{\infty} e^{-pz}\{(z)^{2n}\} dz\right]$$

$$= \sum_{n=0}^{\infty} \frac{1}{n!} A\,(z)^{2n}$$

$$A\left[\sum_{n=0}^{\infty} \frac{z^{2n}}{n!}\right] = \sum_{n=0}^{\infty} \frac{1}{n!} \frac{2n!}{p^{2n+2}}$$

3.13 Aboodh transformation of Convergence Series [4, 5, 6,]:

$$1 + \frac{c+z}{1!} + \frac{(c+2z)^2}{2!} + \frac{(c+3z)^3}{3!} + \cdots$$

$$= \sum_{n=0}^{\infty} \frac{(c+nz)^n}{n!} = f\,(z)$$

$$\text{So, } A\{f(z)\} = A\left\{\sum_{n=0}^{\infty} \frac{(c+nz)^n}{n!}\right\}$$

$$\int_0^{\infty} e^{-pz} \left\{\sum_{n=0}^{\infty} \frac{(c+nz)^n}{n!}\right\} dz,$$

$$\text{let } c + nz = t$$

$$= \sum_{n=0}^{\infty} \frac{1}{p} \int_0^{\infty} e^{-pz} \frac{(c+nz)^n}{n!} dz$$

$$= \sum_{n=0}^{\infty} \frac{1}{p} \int_0^{\infty} e^{-p\left(\frac{t-c}{n}\right)} \frac{t^n}{n!} \frac{dt}{n}$$

$$= \sum_{n=0}^{\infty} \frac{1}{p}\, e^{\frac{pc}{n}} \int_0^{\infty} e^{-p\left(\frac{t}{n}\right)} \frac{t^n}{n!} \frac{dt}{n}, \text{let } \frac{t}{n} = u$$

$$= \sum_{n=0}^{\infty} \frac{1}{p} e^{\frac{pc}{n}} \int_0^{\infty} e^{-pu} \frac{n^n u^n}{n!} \frac{n\,du}{n}$$

$$= \sum_{n=0}^{\infty} e^{\frac{pc}{n}} \frac{n^n}{n!} \frac{1}{p} \int_0^{\infty} e^{-pu} u^n du$$

$$= \sum_{n=0}^{\infty} e^{\frac{pc}{n}} \frac{n^n}{n!} A\,(u^n)$$

Hence,

$$A\left\{\sum_{n=0}^{\infty} \frac{(c+nz)^n}{n!}\right\} = \sum_{n=0}^{\infty} e^{\frac{pc}{n}} \frac{n^n}{p^{n+2}}$$

Conclusion:

In this paper, we have found the Aboodh Transform of some power series and it comes out to be very foremost tool to find the Aboodh Transform of power series.

References:

1 Dinesh Verma, Putting Forward a Novel Integral Transform: Dinesh Verma Transform (DVT) and its Applications, International Journal of Scientific Research in Mathematical and Statistical Sciences, Volume -7, Issue-2, April-2020, pp: 139-145.

2 Rahul gupta, Rohit gupta and Dinesh Verma, Propounding a New Integral Transform: Gupta Transform with Applications in Science and Engineering, *International Journal of scientific research in multidisciplinary studies (IJSRMS)*, Volume-6, Issue-3, March 2020, pp: 14-19.

3 Mohamed Elarabi Benattia, Kacem Belghaba, Application Of Aboodh Transform For Solving First Order Constant Coefficients Complex Equation, General Letters in Mathematics Vol. 6, No. 1, Mar 2019, pp.28-34.

4 Dinesh Verma and Rohit Gupta, Laplace Transformation approach to infinite series, International Journal of Advance and Innovative Research, Volume 6, Issue 2 (XXXIII): April – June, 2019.

5 B.V.Ramana, Higher Engineering Mathematics.

6 Dr. B.S. Grewal, Higher Engineering Mathematics.

7 Shiferaw Geremew Gebede, Laplace transform of power series, impact: international journal of research in applied, natural and social sciences (impact: IJRANSS), Issn (p): 2347-4580; Issn (e): 2321-8851, vol. 5, Issue 3, mar 2017, 151-156.

8 Dinesh Verma, Rohit Gupta and Amit Pal Singh, Analysis of Integral Equations of convolution via Residue Theorem Approach, The International Journal of analytical and experimental modal, Volume-12, Issue-1, January 2020, 1565-1567.

9 Dinesh Verma, Analyzying Leguerre Polynomial by Aboodh Transform, ASIO Journal of Chemistry, Physics, Mathematics & Applied Sciences (ASIO-JCPMAS), Volume -4, Issue-1, 2020, ISSN: 2455-7064, PP:14-16.

10 Dinesh Verma and Rohit Gupta, Aplications of Elzaki Transform to Electrical Network Circuits with Delta Function, ASIO Journal of Chemistry, Physics, Mathematics & Applied Sciences (ASIO-JCPMAS), Volume -4, Issue-1, 2020, ISSN: 2455-7064, PP:21-23.

11 Dinesh Verma and Rohit Gupta, Analyzying Boundary Value Problems in Physical Sciences via Elzaki Transform, by in ASIO Journal of Chemistry, Physics, Mathematics & Applied Sciences (ASIO-JCPMAS), Volume -4, Issue-1, 2020, ISSN: 2455-7064, PP:17-20.

12 Dinesh Verma, Elzaki Transform Approach to Differential Equatons with Leguerre Polynomial, *International Research Journal of Modernization in Engineering Technology and Science (IRJMETS),* Volume-2, Issue-3, March 2020, pp: 244-248.

13 Dinesh Verma, Elzaki Transform of some significant Infinite Power Series, *International Journal of Advance Research and Innovative Ideas in Education (IJARIIE)*, Volume-6, Issue-1, February 2020, pp:1201-1209.
14 Dinesh Verma, Aftab Alam, Analysis of Simultaneous differential Equations by Elzaki Transform Approach, Science, Technology and Development Journal, Volume-9, Issue-1, January 2020, pp: 364-367.
15 Dinesh Verma, Applications of Laplace Transform to Differential Equations with Discontinuous Functions, New York Science Journal, Volume-13, Issue-5, May 2020, pp: 66-68.
16 Dinesh Verma, A Laplace Transformation approach to Simultaneous Linear Differential Equations, New York Science Journal" Volume-12, Issue-7, July 2019, pp: 58-61.
17 Dinesh Verma, A Useful technique for solving the differential equation with boundary values, Academia Arena" Volume-11, Issue-2, 2019, pp: 77-79.
18 Dinesh Verma, Relation between Beta and Gamma function by using Laplace Transformation, Researcher, Volume-10, Issue-7, 2018, pp: 72-74.
19 Dinesh Verma, An overview of some special functions, International Journal of Innovative Research in Technology (IJIRT), Volume-5, Issue-1, June 2018, pp: 656-659.
20 Dinesh Verma, Applications of Convolution Theorem, International Journal of Trend in Scientific Research and Development (IJTSRD), Volume-2, Issue-4, May-June 2018, pp: 981-984.
21 Dinesh Verma, Solving Fourier Integral Problem by Using Laplace Transformation, International Journal of Innovative Research in Technology (IJIRT), Volume-4, Issue-11, April 2018, pp:1786-1788.
22 Dinesh Verma, Applications of Laplace Transformation for solving Various Differential equations with variable co-efficient, International Journal for Innovative Research in Science and Technology (IJIRST), Volume-4, Issue-11, April 2018, pp: 124-127.
23 Dinesh Verma and Amit Pal Singh, Applications of Inverse Laplace Transformations, Compliance Engineering Journal, Volume-10, Issue-12, December 2019, ISSN 0898-3577; PP: 305-308.
24 Dinesh Verma and Rohit Gupta, A Laplace Transformation of Integral Equations of Convolution Type, International Journal of Scientific Research in Multidisciplinary Studies, Volume-5, Issue-9, September 2019, pp: 94-96.
25 Dinesh Verma and Amit Pal Singh, Solving Differential Equations Including Leguerre Polynomial via Laplace Transform, *International Journal of Trend in scientific Research and Development (IJTSRD)*, Volume-4, Issue-2, February 2020, pp:1016-1019.
26 Dinesh Verma, Signification of Hyperbolic Functions and Relations, International Journal of Scientific Research & Development (IJSRD), Volume-07, Issue-5, May 2019, pp: 01-03.
27 H.R.Gupta, Dinesh verma, Effect of Heat and mass transfer on oscillatory MHD flow, Journal of applied mathematics and fluid mechanics, Volume- 3 November 2 (2011), PP: 165-172.
28 Dinesh Verma and Binay Kumar, Modeling for Maintence job cost-An Approach, International Journal for Technological Research in Engineering (IJTRE), Volume-2, Issue-7, March 2015, ISSN:No. 2347-4718.PP: 752-759.
29 Monika Kalra, Dinesh Verma, Effect of Constant Suction on Transient Free Convection Gelatinous Incompressible Flow Past a Perpendicular Plate With Cyclic Temperature Variation in Slip Flow Regime, International Journal of Innovative Technology and Exploring Engineering (IJITEE), volume-2, Issue-4, March (2013), PP:42-44.
30 Dinesh Verma, Monika Kalra, Free Convection MHD Flow Past a Vertical Plate With Constant Suction, International Journal of Innovative Technology and Exploring Engineering (IJITEE), volume-2, Issue-3, February (2013), PP: 154-157.
31 Nitin Singh Sikarwar and Dinesh Verma, Micro Segmentation: Today's Success Formulae, International Journal of Operation Management and Services, vol. 2, November 1 (2012), PP: 1-6.
32 Nitin Singh Sikarwar, Dinesh verma, Faculty Stress Management, Global Journal of Management Science and Technology, Vol. 1, Issue 6 (July 2012), pp: 20-26.
33 Dinesh Verma and Vineet Gupta, Uniform and non-uniform flow of common axis cylinder, International e journal of Mathematics and Engineering, Vol. I (IV) (2011), pp: 1141-1144.
34 Rohit Chopra, Arvind Dewangan, Dinesh Verma, Importance of Aerial Remote Sensing Photography, International e journal of Mathematics And Engineering, Vol. I (IV) (2010), pp:757-760.
35 Dinesh verma,. Vineet Gupta, Arvind dewangan, Solution of flow problems by stability, International e journal of Mathematics and Engineering, Vol. I (II) (2010), PP: 174-179.

36 Dinesh Verma, Empirical Study of Higher Order Diffeential Equations with Variable Coefficient by Dinesh Verma Transformation (DVT), ASIO Journal of Engineering & Technological Perspective Research (ASIO-JETPR), Volume - 5, Issue-1, 2020, pp:04-07.

7/18/2020