

DEGENERATE STIRLING NUMBERS
AND A FAMILY OF BELL POLYNOMIALS

MADJID SEBAOUI, GHANIA GUETTAI, DIFFALAH LAISSAOUI, and MOURAD
RAHMANI

Abstract. In this paper, we employ generating functions' techniques to obtain some identities involving degenerate Bell polynomials, multivariate Bell polynomials, and Carlitz degenerate Stirling numbers. Moreover, we obtain some formulas related to an explicit representation and recurrence relations for Lah polynomials.

MSC 2010. 11B73, 11B83, 05A19.

Key words. Bell partition polynomials, degenerate Stirling numbers, Lah numbers and polynomials.

REFERENCES

- [1] E. T. Bell, *Exponential polynomials*, Ann. of Math. (2), **35** (1934), 258–277.
- [2] F. Bounebirat, D. Laissaoui and M. Rahmani, *Some combinatorial identities via Stirling transform*, Notes Number Theory Discrete Math., **24** (2018), 92–98.
- [3] K. N. Boyadzhiev, *A series transformation formula and related polynomials*, Int. J. Math. Math. Sci., **23** (2005), 3849–3866.
- [4] K. N. Boyadzhiev, *Exponential polynomials, Stirling numbers, and evaluation of some gamma integrals*, Abstr. Appl. Anal., **2009** (2009), 1–18.
- [5] L. Carlitz, *Degenerate Stirling, Bernoulli and Eulerian numbers*, Util. Math., **15** (1979), 51–88.
- [6] C. A. Charalambides, *Enumerative combinatorics*, CRC Press Series on Discrete Mathematics and its Applications, Chapman & Hall/CRC, Boca Raton, FL, 2002.
- [7] L. Comtet, *Advanced combinatorics. The art of finite and infinite expansions*, D. Reidel Publishing Co., Dordrecht, 1974.
- [8] A. Dil and V. Kurt, *Investigating geometric and exponential polynomials with Euler-Seidel matrices*, J. Integer Seq., **14** (2011), 1–12.
- [9] F. T. Howard, *Bell polynomials and degenerate Stirling numbers*, Rend. Semin. Mat. Univ. Padova, **61** (1979), 203–219.
- [10] L. Kargin and R. B. Corcino, *Generalization of Mellin derivative and its applications*, Integral Transforms Spec. Funct., **27** (2016), 620–631.
- [11] T. Kim, D. S. Kim and D. V. Dolgy, *On partially degenerate Bell numbers and polynomials*, Proc. Jangjeon Math. Soc., **20** (2017), 337–345.

The authors are grateful to referees for their careful reading, suggestions and valuable comments which have improved this paper substantially.

- [12] M. Mihoubi, *Bell polynomials and binomial type sequences*, Discrete Math., **308** (2008), 2450–2459.
- [13] M. Mihoubi and M. Rahmani, *The partial r -Bell polynomials*, Afr. Mat., **28** (2017), 1167–1183.
- [14] F. Qi, D.-W. Niu, D. Lim and B.-N. Guo, *Closed formulas and identities for the Bell polynomials and falling factorials*, Contrib. Discrete Math., **15** (2020), 163–174.
- [15] M. Rahmani, *Generalized Stirling transform*, Miskolc Math. Notes, **15** (2014), 677–690.
- [16] M. Sebaoui, D. Laissaoui, G. Guettai and M. Rahmani, *On s -Lah polynomials*, Ars Combin., **142** (2019), 111–118.

Received May 26, 2021

Accepted February 28, 2022

University Yahia Farès Médéa
Faculty of Science, urban pole, 26000
Médéa, Algeria

E-mail: msebaoui@gmail.com

<https://orcid.org/0000-0002-4918-8206>

E-mail: guettai78@yahoo.fr

<https://orcid.org/0000-0003-0320-1150>

E-mail: laissaoui.diffalah74@gmail.com

<https://orcid.org/0000-0002-6453-4453>

USTHB

Faculty of Mathematics
P.O. Box 32, El Alia, 16111
Algiers, Algeria

E-mail: mrahmani@usthb.dz

<https://orcid.org/0000-0003-3097-6381>