

THE GENERALIZED ISI INDEX OF SOME DERIVED NETWORKS

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ABSTRACT. A network is formed by nodes communicating with each other. A topological index is a numerical quantity which is obtained from a network or a graph of a chemical compound, which characterizes the molecule on the basis of its structural properties. Recently Buragohain *et al.* [8] propose and study a novel generalized topological index, which is termed as generalized ISI index for some chemical structures. In this communication, we compute this generalized topological index for some derived networks, namely Honeycomb network, Sierpinski network, Cayley tree network, Butterfly network, Benes network and Mesh-derived networks.

REFERENCES

- [1] M. Ahmed, M. Javaid, M. Saeed and C.H. Jung: *Valency-based molecular descriptors of bakelite network BN_m^n* , Open Chem., **17**(2019), 663-670.
- [2] S. Akhter, M. Imran, W. Gao and R. Farahani: *On topological index of Honeycomb networks and graphene networks*, Hacet. J. Math. Stat., **47**(2018), 19-35.
- [3] H. Ali and A.Q. Baig: *On topological properties of hierarchical interconnection networks*, J. Appl. Math. Comput., **55**(2017), 313-334.
- [4] R.V. Araújo, S. Santos, E.I. Ferreira and J. Giarolla: *New advances in general biomedical applications of PAMAM dendrimers*, Molecules, **23**(2018), No. 11, 28-49.
- [5] S.C. Basak and G.J. Niemi: *Predicting properties of molecules using graph invariants*, J. Math. Chem., **7**(1991), 243-272.
- [6] B. Bollobás and P. Erdős: *Graphs of extremal weights*, Ars Combin., **50**(1998), 225-233.
- [7] E. Buhleier, W. Wehner and F. Vögtle: *Cascade and nonskid-chain-like synthesis of molecular cavity topologies*, Synth., **2**(1978), 155-158.
- [8] J. Buragohain, B. Deka and A. Bharali: *A generalized ISI index of some chemical structures*, Journal of Molecular Structure, **1208**(2020), p. 127843.
- [9] V.P. Chavda: *Nanobased Nano Drug Delivery: A comprehensive review*, in *Applications of Targeted Nano Drugs and Delivery Systems* (S.S. Mohapatra, S. Ranjan, N. Dasgupta, R. K. Mishra, & S. Thomas (Eds.)), Elsevier, 2019, pp. 69-92.
- [10] M.V. Diudea and G. Katona: *Molecular topology of dendrimers*, in *Advances in Dendritic Macromolecules, Volume 4* (G.A. Newkome (Ed.)), Elsevier, JAI Press, 1999, pp. 135-201.

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- [11] E. Estrada: *Atom-bond connectivity and energetic of branched alkanes*, Chem. Phys. Lett., **463**(2008), 422-425.
- [12] E. Estrada, L. Torres, L. Rodríguez and I. Gutman: *An atom-bond connectivity index: modeling the enthalpy of formation of alkanes*, Indian J. Chem., **37A**(1998), 849-855.
- [13] S. Fajtlowicz: *On conjectures of grafitti II*, Congr. Numer., **60**(1987), 189-197.
- [14] W. Gao, Z. Iqbal, M. Ishaq, A. Aslam and R. Sarfraz: *Topological aspect of dendrimers via distance based descriptors*, IEEE Access, **7**(2019), 35619-35630.
- [15] I. Gutman and M. Lepović: *Choosing the exponent in the definition of connectivity index*, J. Serb. Chem. Soc., **66**(2001), No. 9, 605-611.
- [16] I. Gutman: *Degree based topological indices*, Croat. Chem. Acta, **86**(2013), 351-361.
- [17] I. Gutman: *On hyper Zagreb index and coindex*, Bull. Cl. Sci. Math. Nat. Sci. Math., **150**(2017), 1-8.
- [18] I. Gutman, E. Milovanović and I. Milovanović: *Beyond the Zagreb indices*, AKCE Int. J. Graphs Comb., (2018), 14 pages.
doi: 10.1016/j.akcej.2018.05.002
- [19] Z. Hussain, M. Munir, M. Bilal, A. Ameer, S. Rafique and S.M. Kang: *Computational analysis of new degree-based descriptors of oxide networks*, Open Chem., **17**(2019), 177-182.
- [20] M. Imran, S.E. Hafi and W. Gao: *On topological properties of Sierpinski network*, Chaos Solitons Fractals, **98**(2017), 199-204.
- [21] M. Imran, S. Hayat and M.Y.H. Maik: *On topological indices of certain interconnection networks*, Appl. Math. Comput., **244**(2014), 936-951.
- [22] M. Imran, A.Q. Baig and W. Khalid: *On topological indices of fractal and Cayley tree type dendrimers*, Discrete Dyn. Nat. Soc., **2018**(2018), Article ID 2684984, 11 pages.
- [23] T.P. Jude, E. Panchadcharam and K. Masilamani: *Computation of Zagreb indices and Randić indices of two new biodegradable dendrimers used in cancer therapy*, Ceylon J. Sci., **48**(2019), No. 4, 359-366.
- [24] S.M. Kang, M.A. Zahid, A.R. Virk, W. Nazeer and W. Gao: *Calculating the degree-based topological indices of dendrimers*, Open Chem., **16**(2018), 681-688.
- [25] P. Kesharwani, K. Jain and N.K. Jain: *Dendrimers as nanocarrier for drug delivery*, Progress Polymer Sci., **39**(2014), 268-307.
- [26] S. Klavžar and U. Milutinović: *Graphs $S(n, k)$ and a variant of the tower of Hanoi problem*, Czechoslovak Math. J., **47**(1997), 95-104.
- [27] V.R. Kulli: *Revan indices of oxide and Honeycomb networks*, Int. J. Math. Appl., **5**(2017), 663-667.
- [28] P.D. Manuel, M.I. Abd-El-Barr, I. Rajasingh and B. Rajan: *An efficient representation of Benes networks and its applications*, J. Discrete Algorithms, **6**(2008), 11-19.
- [29] M. Matejić, I. Milovanović and E. Milovanović: *On bounds of harmonic topological index*, Filomat, **32**(2018), 311-317.
- [30] G.R. Newkome, C.N. Moorefield and F. Vögtle: *Dendrimers and Dendrons*, Wiley-VCH Verlag GmbH, & Co. KGaA, Germany, 2002.
- [31] H.O. Pierson: *Handbook of Carbon, Graphite, Diamond and Fullerenes*, Noyes Publications, 1994.
- [32] I. Rajasingh, A.S. Shanthi and A. Muthumalai: *Excessive index for Mesh-derived networks*, J. Discrete Algorithms, **38**(2015), 43-48.
- [33] H.S. Ramane, B. Basavanagoud and A.S. Yalnaik: *Harmonic status index of graphs*, Bull. Math. Sci. Appl., **17**(2016), 24-32.

- [34] M. Randić: *On characterization of molecular branching*, J. Amer. Chem. Soc., **97**(1975), No. 23, 6609-6615.
- [35] M. Randić and J. Zupan: *On interpretation of well-known topological indices*, J. Chem. Inf. Comput. Sci., **41**(2001), 550-560.
- [36] P. Sarkar, N. De and A. Pal: *The generalized Zagreb index of some carbon structures*, Acta Chemica Iasi, **26**(2018), No. 1, 91-104.
- [37] P. Sarkar, N. De, I.N. Cangöül and A. Pal: *Generalized Zagreb index of some dendrimer structures*, Univ. J. Math. Appl., **1**(2018), No. 3, 160-165.
- [38] P. Sarkar, N. De, I.N. Cangöül and A. Pal: *The (a, b)-Zagreb index of some derived networks*, J. Taibah Univ. Sci., **13**(2019), No. 1, 79-86.
- [39] G.H. Shirdel, H. Rezapour and A.M. Sayadi: *The hyper-Zagreb index of graph operations*, Iran. J. Math. Chem., **4**(2013), 213-220.
- [40] N. Soleimani, S.B. Bahnamiri and Md.J. Nikmihir: *Study of dendrimers by topological indices*, Acta Chemica Iasi, **25**(2017), No. 2, 145-162.
- [41] I. Stojmenovic: *Honeycomb networks: topological properties and communication algorithms*, IEEE Trans. Parallel Distrib. Syst., **8**(1997), No. 10, 1036-1042.
- [42] D.A. Tomalia, H. Baker, J.R. Dewald, M. Hall, G. Kallos, S. Martin, J. Roeck, J. Ryder and P. Smith: *A new class of polynomials: starburst-dendritic macromolecules*, Polym. J., **17**(1985), 117-132.
- [43] D. Vukičević and M. Gašparov: *Bond Additive Modeling. Adriatic indices*, Croat. Chem. Acta, **83**(2010), 243-260.
- [44] L. Zhang: *The harmonic index for graphs*, Appl. Math. Lett., **25**(2012), 561-566.
- [45] B. Zhou and N. Trinajstić: *On a novel connectivity index*, J. Math. Chem., **46**(2009), 1252-1270.
- [46] B. Zhou and N. Trinajstić: *On general sum-connectivity index*, J. Math. Chem., **47**(2010), 210-218.

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