Title:	Combinatorial properties of some monomial ideals induced by graphs and permutations
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Abstract:	Monomial ideals provide a bridge between combinatorics and commutative algebra. In this thesis we consider three families of monomial ideals: 1-skeleton ideal of the G-parking function ideal M G , monomial ideals induced by permutation avoiding patterns, and the edge ideals of circulant graphs. The 1-skeleton (1) ideal M G is a subideal of M G . Postnikov and Shapiro showed that the number of standard monomials e G , where Le G is the truncated Laplace matrix of G. We prove that number of of M G is also given by det L (1) e G , where Q e G is the truncated signless Laplace matrix standard monomials of M G is bounded below by det Q of G. We have also given examples of some families of graphs for which this lower bound is attained. Next, we consider monomial ideals induced by some permutation avoiding patterns. We show that number of standard monomials of Alexander dual of the monomial ideal induced by 132 and 312 avoiding patterns are also enumerated by number of rooted labeled forests avoiding 213 and 312 patterns. Formulas for number of standard monomials for other permutation avoiding patterns are also obtained. Finally, we study edge ideals of the following three families of circulant graphs C n (1, . . . , b j, . . . , b n 2 c), lm lm b . . . , 3l, b . . . , b c) and C lm (1, 2, . . . , b b . . . , b c) and obtain all N-graded Betti numbers C lm (1, 2, . . . , 2l, l, . . . , 2l, 2 2 of these ideals. Other algebraic and combinatorial properties such as when these graphs are well-covered, shellable, Cohen-Macaulay, Buchsbaum etc. are also discussed. The results are based on research done in collaboration with C. Kumar, G. Lather and S. Anand
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