List of Symbols

$A(D)$	the set of arcs of D; 49
$B(G)$	the bipartite graph of graph G; 299
c	the capacity function of a network; 87
$c(a)$	the capacity of arc a; 87
C_n	the cycle of length n; 19
$\text{cap}K$	the sum of the capacities of the arcs in K; 89
$cl(G)$	the closure of G; 172
$d_G(v)$	the degree of the vertex v in G; 14
$d(v)$	the degree of the vertex v in a graph; 14
$(d_1, d_2, \ldots, d_n)$	the degree sequence of a graph; 15
$d(u, v)$	the length of a shortest u–v path (respectively directed path) in a graph; 20 (respectively digraph; 64)
$d_D^+(v)$	the outdegree of v in D; 50
$d^+(v)$	the outdegree of v in a digraph; 50
$d_D^-(v)$	the indegree of v in D; 51
$d^-(v)$	the indegree of v in a digraph; 51
$d_D(v)$	the degree of v in D; 51
D	a directed graph or digraph; 49
D_n	the dihedral group of order $2n$; 46
$\text{diam}(G)$	the diameter of G; 47
$E(G)$	the edge set of G; 3
E	the edge set of a graph; 5
$e(v)$	the eccentricity of vertex v; 110
$f^+(S)$	$f([S, \bar{S}])$, where $S \subseteq V(D)$; 88

$f^{-}(S)$	$f([\bar{S}, S])$, where $S \subseteq V(D)$; 88
$\phi(G)$	the number of faces of a planar graph G; 244
$f(G; \lambda)$	the chromatic polynomial of G; 229
f_{uv}	$f((u, v))$; 88
G	a graph; 3
G^c	the complement of a simple graph G; 9
$G(D)$	the underlying graph of D; 49
$G(X, Y)$	a bipartite graph G with bipartition (X, Y); 9
$G[S]$	the subgraph of G induced by the subset S of $V(G)$; 11
$G[E']$	the subgraph of G induced by the subset E' of $E(G)$; 11
$G + uv$	the supergraph of G obtained by adding the new edge uv; 11
$G - v$	the subgraph of G obtained by deleting the vertex v; 13
$G - S$	the subgraph of G obtained by the deletion of the vertices in S; 13
$G - e$	the subgraph of G obtained by deleting the edge e; 13
$G - E'$	the subgraph of G obtained by the deletion of the edges in E'; 13
$G_1 \cup G_2$	the union of the two graphs G_1 and G_2; 37
$G_1 + G_2$	the sum of the two graphs G_1 and G_2; 37
$G_1 \cap G_2$	the intersection of the two graphs G_1 and G_2; 37
$G_1 \vee G_2$	the join of the two graphs G_1 and G_2; 37
$G_1 \times G_2$	the Cartesian product of the graph G_1 with the graph G_2; 38
$G_1[G_2]$	the composition or lexicographic product of the graph G_1 with the graph G_2; 39
$G_1 \circ G_2$	the normal product or the strong product of the graph G_1 with the graph G_2; 40
$G_1 \otimes G_2$	the tensor product or the Kronecker product of the graph G_1 with the graph G_2; 41
$G \circ e$	the graph obtained from G by contracting the edge e; 116
G^*	the canonical dual of the plane graph G; 256
G_4	Grötszch graph; 213
G^k	the k-th power of G; 42
I_D	the incidence map of D; 49
I_G	the incidence map of G; 3
K_n	the complete graph on n vertices; 7
$K_{p,q}$	the complete bipartite graph with part sizes p and q; 9

$K_{1,q}$	the star of size q; 9
$K(G)$	the clique graph of G; 299
$L(G)$	the line graph of the graph G; 29
$m(G)$	the size of $G =$ the number of edges in G; 5
m	the size (= the number of edges) of a graph; 5
$N_G(v)$	the open neighborhood of the vertex v in G; 4
$N(v)$	the open neighborhood of the vertex v in a graph; 4
$N_G[v]$	the closed neighborhood of the vertex v in G; 4
$N[v]$	the closed neighborhood of the vertex v in a graph; 4
$n(G)$	the order of $G =$ the number of vertices of G; 5
n	the order of a graph; 5
$N_D^+(v)$	the set of outneighbors of v in D; 50
$N^+(v)$	the set of outneighbors of v in a digraph; 50
$N_D^-(v)$	the set of inneighbors of v in D; 50
$N^-(v)$	the set of inneighbors of v in a digraph; 50
N	a network; 87
$N(S)$	the neighbor set of S in a graph; 139
$\mathrm{o}(G)$	the number of odd components of G; 144
P	the Petersen graph; 8
P_n	the path on n vertices; 19
P^{-1}	the inverse of the path P; 19
Q_n	the n-cube; 136
rG	the sum of r copies of the graph G; 37
$r(G)$	the radius of graph G; 111
s	the symmetric group of degree n; 27
S_n	the source of a network; 87
$[S, S']$	the set of all arcs having their tails in S and heads in S' in the case of directed graphs; 55 (the set of all edges having one end in S and the other end in S' in the case of undirected graphs; 67)
$s(v)$	the score of the vertex v in a tournament; 61
$(s(v_1), s(v_2), \ldots, s(v_n))$	the score vector of a tournament with vertex set $\{v_1, v_2, \ldots, v_n\}$; 61
t	the sink of a network; 87
$v_0e_1v_1e_2v_2 \ldots e_rv_r$	a (v_0, v_r) walks in a graph; 18
V	the vertex set of a graph; 5
$V(D)$	the set of vertices of D; 49
$V(G)$	the vertex set of G; 3
$\mathrm{val}\ f$	the value of the flow $f = f^+(s) - f^-(s) = f^-(t) - f^+(t)$; 89
W_n	$C_n \vee K_1$, the wheel with n spokes; 37

$\cong$	is isomorphic to; 7
α(G)	the independence number of G; 129
α'(G)	the cardinality of a maximum matching of G; 130
β(G)	the covering number of G; 129
β'(G)	the cardinality of a minimum edge covering of G; 130
$\Gamma(G)$	the group of automorphisms of the graph G; 25
$\delta(G)$	the minimum degree of G; 14
δ	the minimum degree of a graph; 14
$\Delta(G)$	the maximum degree of G; 14
Δ	the maximum degree of a graph; 14
$\phi_1 \circ \phi_2$	the composition of the mappings ϕ_1 and ϕ_2 (ϕ_2 followed by ϕ_1); 26
$\lambda(G)$	the edge connectivity of G; 73
λ	the edge connectivity of a graph; 73
$\lambda_c G$	the cyclical edge connectivity of G; 85
$\kappa(G)$	the vertex connectivity of G; 73
κ	the vertex connectivity of a graph; 73
$\theta(G)$	the clique covering number of $G =$ the minimum number of cliques of G that cover the vertex set of G; 285
$\tau(G)$	the number of spanning trees of G; 116
$\omega(G)$	the clique number of $G =$ the order of a maximum clique of G; 285
$\omega(G)$	the number of components of G; 20
$\chi(G)$	the chromatic number of G; 199
$\chi'(G)$	the edge chromatic number or chromatic index of G; 215

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