

C O M B I N A T O R I C S

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*Combinatorics* is the newsletter of the Combinatorial Mathematics Society of Australasia, and is published by the Society. Annual subscription rate for individual non-members and institutions is \$A4. All enquiries should be directed to the C.M.S.A., c/o Dr. Sheila Williams, Department of Mathematics, University of Queensland, St. Lucia, Queensland, 4067, Australia.

RESEARCH ANNOUNCEMENTS

Please send contributions to Dr. D.A. Holton, Department of Mathematics, University of Melbourne, Parkville, Vic., 3052. An Asterisk indicates that preprints of that article are available.

- \*A. Gardiner and D.A. Holton, Cycles with prescribed and proscribed vertices.
- \*R.B. Eggleton and D.A. Holton, Simple and multigraphic realizations of degree sequence.
- \*D.A. Holton, B.D. McKay, M.D. Plummer and C. Thomassen, A nine point theorem for 3-connected cubic graphs.

NEW PUBLICATIONS

Authors are invited to contribute lists of publications from 1978 and send future details of publications on appearance to Dr. D.A. Holton, Department of Mathematics, University of Melbourne, Parkville, Vic., 3052.

- D. Billington, Degree sequences uniquely realisable within sets of hypergraphs, *Ars Comb.*, X, 1980, 65-83.
- A. Hartman, Kirkmans trombone player problem "Seventy-six trombones led the big parade" - M. Willson, *Ars Comb.*, X, 1980, 19-26.
- A. Hartman, Tripling quadruple systems, *Ars Comb.*, X, 1980, 255-311.
- K. Heinrich and W.D. Wallis, Almost graeco-latin squares, *Ars Comb.*, X, 1980, 55-65.
- R. Mathon and S.A. Vanstone, On the existence of doubly resolvable Kirkman systems and equidistant permutation arrays, *Discrete Maths*, 30, 1980, 157-172.
- J. Seberry, An infinite family of skew-weighting matrices, *Ars Comb.*, X, 1980, 323-329.
- J.R. Seberry and D.B. Skillicorn, All directed bibds with  $k = 3$  exist, *J. Comb. Th.*, 29A, 1980, 244-248.
- D.B. Skillicorn, Minimal sequences containing contiguous permutation subsequences, *Proc. Ninth Manitoba Conf. on Numerical Maths and Computing*, 1979, 393-397.
- R.G. Stanton, A conjecture on quintuple systems, *Ars Comb.*, X, 1980, 187-193.
- S.A. Vanstone, Doubly resolvable designs, *Discrete Maths*, 29, 1980, 77-86.

GENERAL ANNOUNCEMENTSCoding Theory at Queensland in August:

During August the University of Queensland Mathematics Department will have four visitors in Coding Theory financed by a grant from the University's General Development Fund. Professor Vera Pless (University of Illinois at Chicago Circle), Dr. Peter Cameron (Merton College, Oxford) and Dr. Cheryl Praeger (University of Western Australia) will visit for the whole of August; Professor W.D. Wallis (University of Newcastle) will visit during the third week of August (17th - 21st).

Professor Pless plans to give two series of instructional lectures during August, one introductory series and another at a more advanced level. She, Dr. Cameron and Dr. Praeger will all speak at the Conference in the last week of August.

The Department of Computer Science will also be playing host to several visitors in July and August. Professor Eugene Luks will be in Brisbane from 18th July to 3rd August and will give five lectures on aspects of algebraic complexity, including his famous theorem on graph isomorphism. Professor Rudolf Mathon and Dr. Brendan McKay will also be in Brisbane from 16th-28th August and it is hoped to organise an informal workshop on computational problems in graph theory the week before 9ACCM.

Combinatorics Conferences:

The Practice of Operational\*Research, 12th-14th July, 1982, Lausanne, Switzerland. All aspects of the practice of O.R. will be considered but special consideration will be given to papers describing work for a client. Papers in the fields of applications, state of the art, methods, industrial work and theoretical developments will be welcomed. For details and preregistration forms write to Ray Showell at the O.R. Society's offices at Neville House. Closing date is 14th September.

Mathematics in Industry, see the details which follow.

Tenth Australian Conference on Combinatorial Maths., 22nd-27th August, 1982, hopefully at University of Adelaide. For further details contact Dr. L. Rey A.Casse, Department of Pure Maths., University of Adelaide, G.P.O.Box 498, Adelaide, S.A.5001.

Proceedings of 8ACCM:

These proceedings are now in the hands of Springer-Verlag for publication as a volume in their Lecture Notes in Mathematics series. It runs to xi + 359 pages and contains 2 expository, 9 invited and 20 contributed papers. Volume number and publication date are as yet unknown.

HIGHER DEGREES

Supervisors of higher degree theses on combinatorial mathematics in Australasian institutions are invited to send details - recipient's name, supervisor's name, degree, date awarded, institution, title, abstract - to Dr. Anne Penfold Street, Department of Mathematics, University of Queensland, St. Lucia, Queensland, 4067.

<u>Student</u>	<u>Supervisor</u>	<u>Title</u>
<u>Degree</u>	<u>Institution</u>	<u>Abstract reference</u>
<u>Date Awarded</u>		
H.M. Gastineau-Hills Ph.D. 1981	J. Seberry U. of Sydney	Systems of Orthogonal Designs and Quasi Clifford Algebras Bull.Austral.Math.Soc. <u>24(1981), 157-158.</u>

AUSTRALIAN MATHEMATICAL SOCIETY  
Applied Mathematics Division  
 QUEENSLAND BRANCH

Announcing a meeting on

MATHEMATICS IN INDUSTRY

TIME: 2.45 p.m. Friday, 21st August, 1981.

PLACE: Basement Lecture Room, B.01, Priestley Building, University of Queensland, St. Lucia.

PROGRAMME OF TALKS

- 2.45 p.m. Registration
- 3.20 p.m. Professor J.R. Blake (University of Wollongong, Mathematics Department). *"Mathematical modelling at the University of Wollongong."*
- 4.05 p.m. Dr. T. Downs (University of Queensland, Electrical Engineering Department). *"Some mathematical problems in the communications industry."*
- 4.35 p.m. Dr. P.K.W. Chan (SEQEB). *"Inspection policies for protection equipment in power systems."*
- 5.05 p.m. Dr. J.M. Fitz-Gerald (University of Queensland, Mathematics Department). *"Multiply-periodic economic lot schedules."*
- 5.30 p.m. END.

NOTES

- (1) Due to overhead costs it will be necessary to charge a registration fee of \$6 for this meeting. If you intend to be present, please fill in the attached tear-off box and sent it to me *with your cheque for \$6 by 24 July at latest.*
- (2) If a sufficient number of participants are interested, we could book a room at the University of Queensland Staff Club for a one course meal and some wine after the meeting. The cost would be \$10 per head. Please signify your interest by ticking the box on the tear-off box and adding \$10 to the registration fee.

22nd June, 1981.

V.G. HART,  
 Mathematics Department,  
 University of Queensland,  
 St. Lucia, Queensland, 4067.

Tel. 377-2023  
 or 377-3278 (Secretary)

I wish to register for 21 August, 1981 meeting of the Queensland Branch of the Division of Applied Mathematics, Australian Mathematical Society.

NAME: \_\_\_\_\_ (please print)

ADDRESS: \_\_\_\_\_

I enclose registration fee \$6  
 I would like to book for the meal , (tick box)  
 and enclose an additional \$10

Signature: \_\_\_\_\_ Total \$ \_\_\_\_\_

ABSTRACTSMathematical modelling at the University of Wollongong*Professor J.R. Blake*

A course of mathematical modelling will be described. As part of the assessment students work on mini-projects which involve them in close contact with local industry.

Some mathematical problems arising in the communications industry*Dr. T. Downs*

Computer-controlled telephone exchanges are currently being introduced into the Australian network, offering the prospect of alleviating congestion at busy times by directing traffic (i.e. calls) around pockets of congestion. Some discussion will be given to the analysis problem whose solution is required before any congestion control algorithm can be implemented.

A second problem which will be discussed relates to the design of the "black box" which provides the scanning mechanism in the Interscan aircraft landing system. A major difficulty in the design arises from the fact that some of the components in the system can only be produced with acceptable characteristics by stretching technology to its limits. In an effort to overcome this difficulty, a method of allocating engineering tolerances to complex systems has been developed and a brief description of this method will be given.

Inspection policies for protection equipment in power systems*Dr. P.K.W. Chan*

The reliability of supply at any point in a power system is affected by the scheme of protection and the reliability of the protection system which in turn can be improved by periodic inspection. In this paper two inspection policies are considered. The overall system cost is used as an objective function from which conditions under which inspection is beneficial are derived. A practical example is also presented.

Multiply-periodic economic lot schedules*Dr. J.M. Fitz-Gerald*

Sequential production of several products using a single facility will be considered, and a new class of solutions developed. Any product may be produced several times in one production cycle, each time for a different manufacture period. Conditions under which a given cycle will minimize costs will be discussed, with practical examples, when the facility is used at maximum capacity. Preliminary ideas for handling "slack time" problems will be presented for later discussion.

NINTH AUSTRALIAN CONFERENCE ON COMBINATORIAL MATHEMATICSSecond Notice

The Ninth Australian Conference on Combinatorial Mathematics will be conducted by the Combinatorial Mathematics Society of Australasia at the University of Queensland, Brisbane, Queensland, Australia, from Monday 24 August to Friday 28 August 1981. The third Annual General Meeting of the C.M.S.A. will be held at the conference on Wednesday 26 August 1981. Registration will take place at Union College on the Sunday evening after dinner, where wine and cheese will be available, and also from 8.30 to 9.30 a.m. on Monday 24 August, in Room 5.02 of the Priestley (Mathematics) building. The conference will conclude with lunch on Friday 28 August.

All interested persons are cordially invited to attend. If you intend going to the conference and have not yet sent a reply form or sent an incomplete reply or wish to change your reply to an item, please complete the attached reply form and send it immediately.

PATRONAGE :

We gratefully acknowledge the generous financial support given or promised to the conference by the following organizations:

The University of Queensland	Trafalgar Travel
Australian Mathematical Society	B.H.P. Co.Ltd.
T.A.A.*	Digital Equipment
Xerox	

INVITED ADDRESSES :

Dr. Derrick Breach, (University of Canterbury)  
Star gazing in affine planes.

Dr. Peter Cameron, (Merton College, Oxford)  
Orbits, enumeration and colourings.

Dr. Tony Gardiner, (University of Birmingham, U.K.)

Dr. Bill Kocay, (University of Manitoba)

Dr. Rudi Mathon, (University of Toronto)

Professor U.S.R. Murty, (University of Waterloo)  
Unsolved problems in graph theory.

Professor Vera Pless, (University of Illinois, Chicago Circle)

Dr. Cheryl Praeger, (University of Western Australia)  
When are symmetric graphs characterised by their local properties?

Professor Ralph Stanton, (University of Manitoba)

CONTRIBUTED PAPERS :

So far the following contributed talks of 30 minutes each have been promised : (\* indicates speaker in case of more than one author)

D. Billington, The graph of hypergraphic realisations of denumerable multisets of degrees.

E.J. Billington, Construction of some irreducible designs.

E.J. Billington\* and J.M. Fitzgerald\*, Partitions and the sequence counting problem in Economic Lot Scheduling.

CONTRIBUTED PAPERS contd. :

- R.N. Buttsworth, An exclusion-inclusion transform.  
 J.E. Dawson, Matroid bases, the inverse family and associated operations.  
 P. Eades, L. Foulds\*, J. Giffin and R. Patterson, An efficient heuristic for identifying a maximum weight planar subgraph.  
 M. Ellingham, Constructing certain cubic graphs.  
 H.M. Finucan, Further decomposition of the Catalan number.  
 D.A. Holton\*, B.D. McKay and M.D. Plummer, Variants of Menger's Theorem for 3-connected graphs.  
 J.A. Hoskins, Factoring binary matrices : a weaver's approach.  
 C. Lam\*, L. Thiel, S. Swirecz, A search for ovals in a projective plane of order 10.  
 C.H.C. Little, An interesting decomposition of  $K_{4n, 4n}$  into planar subgraphs.  
 K.L. McAvaney, A characterisation of  $P_2 \times G$  with stability index one.  
 A. Rahilly, Classification of finite tangentially transitive projective planes.  
 D.G. Rogers, Some remarks on additive and complete mappings.  
 D.G. Rogers\* and F. Birand, Some more perfect systems of difference sets.  
 J. Seberry, Some constructions of partially balanced incomplete block designs.  
 D. Skillicorn, Some results on directed coverings of pairs by quadruples.  
 A.P. Street\* and R. Day, Sequential binary arrays.  
 D.J. Street, Relative difference sets and generalised weighing matrices.  
 D.E. Taylor, The calculus of structures and Faa di Bruno's formula.

Others attending the conference include (to date) :

A.H.J. Byrne; N.F. Byrne; J.W. Giffin; W.D. Hoskins;  
 B.H. Neumann; S. Williams; W.H. Wilson.

If you want to present a paper on any area of pure or applied combinatorics but your name and title of paper have not appeared above, please reply on the attached form immediately!

CONFERENCE PROCEEDINGS :

Springer-Verlag have agreed to publish the refereed proceedings of the conference in the Lecture Notes in Mathematics series. Prospective authors are advised that the series editors of LNIM require that

"The contributions should be of a high standard and of current interest. Contributions should contain sufficient information and motivation. Except possibly in the case of major surveys, they should present at least outlines of the proofs, enough to enable an expert to complete them. Thus resumés and mere announcements of papers appearing elsewhere cannot be included, although more detailed versions of a contribution may well be published in other places later."

All prospective authors are asked to bring their papers with them to



the conference in a form suitable for refereeing, either typed or legibly and neatly handwritten. At the latest, papers will be required in this form, ready for refereeing, by 30 September 1981. It is hoped that typing of all papers ready for photo-offset will be done in Queensland, in order to achieve uniformity throughout the volume.

#### ACCOMMODATION :

On campus accommodation has been reserved in Union College, which is a four minute walk away from the location of the lectures. The cost will be \$14 per night, room only (students \$10), and meals are \$2 each, payable by cash in the dining room.

- \* (1) Will anyone requiring accommodation in Union College who
- \* may have special needs (e.g. a physical disability, or
- \* special diet) please notify us when booking. Most
- \* college rooms are at least one floor up, and there are no
- \* lifts.
- \* (2) Average temperatures for this time of year are:
- \* August, 21.8°C max, 10.3°C min;
- \* September, 24.0°C max, 12.9°C min.
- \* Union College advises that people who are accustomed to
- \* sleeping in heated bedrooms may wish to bring an extra
- \* blanket, rug or coat for their beds. Also towels will
- \* be provided in Union College, but no soap.

For some information on hotels and motels, please see the last newsletter, or contact your travel agent. The University is about 6 kilometres from the city.

#### TRAVEL :

The conference airline is TAA once again, and we take this opportunity to thank TAA for their continued support. In addition to helping with the printing of the programme, TAA is offering various Queensland holiday packages, including Gold Coast and North Queensland resorts, which may be of interest; these are available either before or after the conference. Also available are 4 and 7 day flight and accommodation packages at Brisbane hotels, and a 20% discount on Hertz car rentals for conference members. For more information on these matters, contact your local TAA travel representative.

If you wish to be met at Brisbane airport, please let us know your flight details as soon as possible.

If you are travelling by car and would like a map of the campus before arrival, please notify us and we will send you one. Car parking in Union College will be on a first-come first-served basis in the two week August break (16-29 August), and even when the college car park is full, there is usually ample parking at that time of year on the nearby University roads.

REGISTRATION :

Registration fees are payable at the conference, and will be :

- \$25 for CMSA members;
- \$30 for non-members (this gives membership of CMSA for the rest of 1981);
- \$12.50 for student members or unemployed members of CMSA;
- \$15 for non-member students or unemployed people (giving membership of CMSA for the rest of 1981).

PUBLICATIONS STAND :

There will be a display of combinatorics books and journals from various publishers in Room 5.02 of the Priestley (Mathematics) building.

SOCIAL PROGRAMME :

There will be a wine and cheese evening (with Registration) after dinner on the evening of Sunday 23 August, in Union College.

The conference outing will be on the afternoon of Tuesday 25 August. There will be a boat trip up the Brisbane River to Lone Pine, where kangaroos and wallabies may be fed, koalas cuddled, a platypus viewed and carpet snakes, dingoes, exotic birds etc. all seen. [You can be photographed with your choice of koala or carpet snake!] Cost will be about \$10.

On the Monday evening Dr. E.T. Stellar will entertain us with slides and a talk on the Dutch artist M.C. Escher.

The games evening will be held on the Tuesday evening, in Union College.

On the Wednesday evening there will be a visit to the Sir Thomas Brisbane Planetarium for those interested in the stars.

The conference dinner will be on the Thursday evening, in Union College, 7 p.m. for 7.30 p.m. The all-inclusive price is \$12 for registered members of the conference and \$15 for others.

If any visitors are still around on the Friday afternoon and would like some exercise, there will be a (gentle) rain forest walk at nearby Mount Glorious.

AND FINALLY ...

This is the last notice before the conference begins.

Conference mail should be addressed :

c/o Dr. S. Williams,  
Department of Mathematics,  
University of Queensland,  
St. Lucia,  
Queensland 4067,  
Australia,

and it will be placed in Room 5.02 of the Mathematics (Priestley) Building.

The address of Union College is :    Union College,  
  Upland Road,  
  St. Lucia,  
  Queensland 4067,

and the phone number is (07)371-1300.

The mathematics secretaries could also take urgent messages on  
(07)377-3277, or 377-2151.

Lectures will be held in the Mining and Metallurgy lecture theatre,  
which is a 30 second walk from the Mathematics Department.

See you in August!

#### LATE NEWS

The following titles of talks have just been received :

- Dr. Tony Gardiner,    Embedding of  $k$ -regular graphs in  $(k+1)$ -regular  
  graphs.  
U.S. Barua\* and D.A. Holton,    Fast fourier transform and decoding  
  of some codes.  
S.J. Kettle,    On natural correspondence between Catalan objects.  
R. Taylor,    Some results on switchings in graphs.

Reply Form

Please tick appropriate boxes. Return this form to Dr. Sheila Williams, Department of Mathematics, University of Queensland, St. Lucia, 4067, Queensland, Australia, immediately, if there are changes or additions to your earlier submission:

- 1. I expect to attend the conference.
- 2. I cannot attend the conference, but wish to receive further circulars.
- 3. I want to present a 30 minute paper.

Title: \_\_\_\_\_  
\_\_\_\_\_

Please attach a typed abstract.

- 4. I want to attend the Conference Dinner with \_\_\_\_\_ guests.
- 5. I want to attend the excursion with \_\_\_\_\_ guests.

- 6. I want to book the on campus accommodation for the following nights:

Sunday	23/8/81	<input type="checkbox"/>
Monday	24/8/81	<input type="checkbox"/>
Tuesday	25/8/81	<input type="checkbox"/>
Wednesday	26/8/81	<input type="checkbox"/>
Thursday	27/8/81	<input type="checkbox"/>
Friday	28/8/81	<input type="checkbox"/>

Number of persons \_\_\_\_\_

(NB. Some Union College accommodation is also available the week before the conference.)

- 7. I enclose \$ \_\_\_\_\_ (Australian) on campus accommodation deposit (payable to C.M.S.A.; \$10 per person)
- 8. I would like transport from Brisbane Airport to the University of Queensland.

Airline: \_\_\_\_\_ Flight number \_\_\_\_\_  
Expected time of arrival in Brisbane \_\_\_\_\_

Name: \_\_\_\_\_

Address for Notices: \_\_\_\_\_  
\_\_\_\_\_

Telephone Number: \_\_\_\_\_