

ISTRUCTE CHARTERED MEMBERSHIP EXAM AND PREPARATION COURSE 2011

The IStructE Chartered Membership Examination (CME) is one of the most gruelling qualification tests in civil/structural engineering profession. The 7-hour exam paper requires the candidates to convey a grasp of structural engineering principles, an ability to initiate and communicate structural design and provide an effective solution to a structural design problem. The examination is a measure of professional competence, and is often benchmarked by employers as an indicator of the candidate's maturity and professionalism in structural engineering. The examination is held annually worldwide, usually a week after Easter Good Friday. This year, the CME was held on Thursday 28th April instead, because of the wedding of Prince William and Kate Middleton that fell on Friday 29th April 2011.

IES/IStructE Joint Committee organises the annual IStructE Chartered Membership Examination Preparatory Course to assist candidates to prepare for the examination. The course was conducted in February and March this year and comprised two sessions held on two Saturday afternoons. The three tutors were:

- Er. Steve Yeung (WorleyParsons Pte Ltd)
- Er. Wijaya Wong (Arup Singapore Pte Ltd)
- Er. Kang Jianhan (Precast Design Consultants Pte Ltd)

In the first session, the tutors conducted lectures on exam preparation and tips on answering the questions. Steve Yeung also shared his experience of marking the CME scripts as an Examiner, and recommended the Do's and Don'ts to the candidates. The tutors then discussed the questions they had respectively attempted in the actual CME, involving structural concepts development, details, drawings, etc. These were:

- 2006 Q5 Hotel Built on an Existing Quarry (concrete structure)
- 2007 Q5 Visitor's Centre (concrete structure)
- 2006 Q2 Aircraft Hangar (steel structure)

In the second session, candidates who had queries on past exam questions gathered to discuss the questions and solutions as part of their preparation for the exam.

There were 20 candidates who sat for the CME 2011 in Singapore. The IES/IStructE Joint Committee wishes them all the best in the exam.



Steve Yeung speaking on exam tips



Candidates taking the CME 2011



Dear readers, Thank you for taking time to read this newsletter. We appreciate your continued support and would also like to hear from you for whatever reasons. Please direct all your correspondence and inquiries to:

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News Flash

IES AWARDS

On 15th April 2011, the Institution of Engineers Singapore, organized an IES Appreciation Night. Deserving IES members were awarded long service medals and outstanding volunteer awards. The IES/IStructE Joint Committee is pleased that Dr. Boh Jaw Woei was awarded the Bronze Service Award for his 2-year service as an IES council member. Moreover, Er. Mah Guan Pang and Prof. Wang Chien Ming were selected for the IES Outstanding Volunteer Award 2011. Below are the citations read out by Dr. Eicher Low during the award presentation.



Er. Mah Guan Pang receiving the IES Outstanding Volunteer Award from IES President Er. Ho Siong Hin

“Er. Mah chairs the IStructE Structural Awards Panel and he is the advisor of the Singapore Women in Structural Engineering. He has made many significant contributions in many matters related to the IES/IStructE Joint Committee. Besides interviewing candidates to establish their suitability for the Chartered Membership Examination, Er. Mah also chairs the judging panel for the IStructE Best Structural Paper Award and advising the Joint Committee on structural engineering practices and regulations”.



Prof. Wang Chien Ming receiving the IES Outstanding Volunteer Award from IES President Er. Ho Siong Hin

“Prof. Wang Chien Ming serves in the Publication Committee and he is also the Chairman of the IES/IStructE Joint Committee. Since 2007, Prof. Wang has been the Editor-in-Chief for the IES Journal Part A: Civil & Structural Engineering. This Journal is published quarterly by Taylor & Francis. His dedication and immense contributions has made the journal a successful publication of IES”.

Short Courses

COURSE ON DESIGN, DETAILING, SPECIFICATION AND CONSTRUCTION OF NON-SUSPENDED INDUSTRIAL SLABS

A one-day course on *Design, Detailing, Specification and Construction of Non-Suspended Industrial Slabs* was successfully conducted on 14 March 2011.

With the support of the Engineering Alumni of Singapore, the IES/IStructE Joint Committee was able to conduct the course at the Shaw Foundation Alumni House Auditorium at the National University of Singapore. Three speakers, two from the UK and one local engineer, were invited to present their expertise and experience to an enthusiastic audience of about 90 engineering professionals, whose interests range from achieving jointless slabs, quality floor finishes, influence of steel fibre reinforcement to construction of super-flat floors.



Registration of participants

One of the speakers, Mr Rodney Arnold, put it succinctly that *the floor is "arguably the most important part of the building. It is the stage on which all operations take place. Not only it is part of the structure, but also an integrated part of the materials handling system"*. This was an appropriate statement to reinforce the proceedings for the day. The participants were introduced to the construction of non-suspended floors in very large industrial applications in Europe, Middle East and Asia. Mesh reinforced and steel fibre reinforced concrete floors were described and compared. As an example, the construction of a 65,000m² jointless 300mm deep slab was discussed. Output of 1,500–2,500m² of flooring per day can be achieved without the use of formwork.

Participants were also provided with information on the development of a specialised "Combislab" software for the selection of an appropriate non-suspended floor. Every participant was provided with the software tool to enable them to derive an optimum non-suspended slab. This tool removes the mundane repetitive decision making design process and re-calculations needed to derive a non-suspended slab.



Mr Neil Williamson receiving a token of appreciation



Mr Rodney Arnold receiving a token of appreciation



Mr Gan Cheng Chian receiving a token of appreciation

Member's Corner

SEAPORT DEVELOPMENT IN SINGAPORE – THE PAST, PRESENT AND FUTURE

BY ER. DR. HO KWONG MENG, SURBANA INTERNATIONAL CONSULTANTS PTE LTD.

Historical Events of Seaport Development in Singapore

As early as fifth century AD, Singapore was known as “*Temasek*” (淡马锡) or “Sea Town” (海城). In the second half of thirteenth century the name was changed to “*Singapura*”. In an old Chinese historical report “*Tao I Chih Lio*” (岛夷志略) written in 1349, *Temasek* was reported to be barren and inhabited with barbarians addicted to piracy, pillaging and plundering the hapless Chinese traders on their return voyage with their junks heavily laden with goods. The grand Admiral Cheng-ho (郑和) is credited with sailing his fleet through Keppel Harbour while homeward bound on his seventh voyage in 1433, and his maritime expeditions were recorded in an old Chinese navigational chart, the “*Wu Pei Chih Charts*” (武备志海图).

In 1819, *Sir Thomas Stamford Raffles* landed in Singapore. In 1823, Raffles' declared that: “...the Port of Singapore is a Free Port and Trade thereof is open to ships and vessels of every nation free of duty equally and alike to all...”.

By the early 1840s, the population of Singapore River consisted entirely of lightermen working with the lighters following the development of the river as the main commercial centre of Singapore. In 1851, Singapore's first lighthouse, i.e. the Horsburgh Lighthouse, began operating on Pedra Branca at the eastern approaches to the Singapore Strait.

The Singapore Harbour Board was constituted in 1921 and it immediately launched a construction programme to upgrade the port facilities. Port of Singapore Authority was set up in 1964 to replace Singapore Harbour Board.

Construction of Tanjong Pagar (Container) Terminal commenced in around 1968 and the first container berth was opened in 1972. By around 1984, six main berths and 2 reefer berths at Tanjong Pagar Terminal had been completed. Keppel Terminal was converted from general cargo terminal to container terminal between 1980s and 1990s. Container berths of Brani Terminal were constructed in two phases in 1990s with 5 main berths (1,606m long & 15m deep), 3 feeder berths & container stacking yards. Construction of Pasir Panjang Terminal Phase 1 started in 1993 and Phase 2 started in 1995. Construction of Pasir Panjang Phases 1 & 2 completed in late 2000s.

In 1997, Port of Singapore Authority was re-organised into Maritime and Port Authority and PSA Corporation Ltd. Jurong Port was established in 1965 to support the growth of Jurong Industrial Estate, Singapore's first industrial estate.

Present Port Project

Pasir Panjang Phases 3 & 4 Project can be considered as the biggest current port project in Singapore of which Surbana is the Design and Construction Consultant.

Proposed Future Coastal Development Projects in Singapore

The Under-Water Container Terminal

Owing to current shortage of sea-sand for reclamation in the region, constructing wharf apron and container stacking yard of container terminal directly onto the existing seabed may be feasible and economical.



Fig. 1: The Lightermen shifting cargoes to and from Lighters in Singapore River in the past



Fig. 2 The waterfront of Singapore City Centre in the past



Fig. 3: Pasir Panjang Phases 3 & 4 Project which is currently under-construction

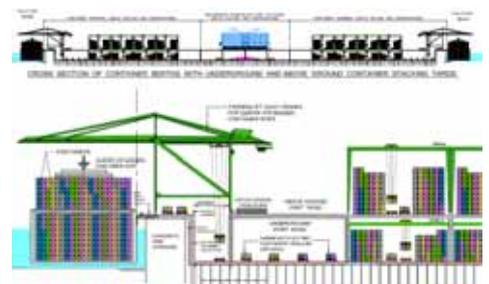


Fig. 4: Cross-section of Offshore Under-Water Container Terminal

As shown in Figure 4, this is a proposed two-tier container terminal with lower deck at the seabed level and the upper deck at platform level of about 10m CD, i.e. about 6.5 meters above the Mean High Water Springs. Front part of upper deck is for loading and unloading of containers using quay cranes. Rear part of upper deck is for container stacking. Lower deck is mainly for container stacking.

The proposed Under-Water Container Terminal is an automated container terminal, with fully or partially automated quay cranes serving at wharf apron, automated guided electric container trailers operating between wharf apron and container stacking yards, and automated over-head container stacking bridge cranes and/or rail-mounted gantries serving at container stacking yards.

Main challenges for this proposed under-water container terminal are:

- To design a reliable quaywall which can take ship collision impact force without damage.
- To design a water-proof quaywall as water barrier to prevent sea-water from entering into the lower floor of the container terminal.
- To design basement floor to cater for buoyancy and eliminate water leakage.

Recommendation:

- To prevent flooding at lower deck due to damage of quaywall by accidental ship collision, second water barrier shall be built.
- To reduce the risk of flooding due to extreme sea-water level, higher platform level for upper deck is recommended.

Offshore Under-Water City

As shown in Figure 5, this proposed Offshore Under-Water City is a satellite city to be built inside a 1,000 meters diameter (or bigger) by 30m high (or higher) circular concrete cofferdam constructed on the seabed near a shoreline. Strong and reliable armouring shore protection system shall be constructed outside the cofferdam to prevent ship collision directly onto this water exclusion structure.

Road is constructed and monorail/sky-train is installed on top of the cofferdam. This City is linked to the mainland with bridges and/or tunnels. The water exclusion structure of this City is similar to the “polders” in Netherlands. If this Under-water City is to be built in Singapore, the ideal locations may be off Marine South and /or off East Coast Park. During the planning stage, Civil Aviation Authority of Singapore (CAAS) shall be consulted for height restriction.

The height restriction at Singapore city centre is 280m from platform (ground) level of about 5m CD. If we construct the tall buildings directly onto the seabed level of about -20m CD, in theory, height of building structures can be increased to 300m or more and they will be the tallest buildings in Singapore in term of height of structures.

This iconic Offshore Under-Water City is expected to become another significant tourist attraction for Singapore. Moreover, with the jetties and marinas provided along the outer part of perimeter wall of this City, it can also become a maritime resort centre. The knowledge gained from this pilot project can be used to solve the sea water rising issues due to global warming and this knowledge is marketable in consultancy services. Figure 6 shows the tall buildings and structures to be built inside and outside the proposed City and Figure 7 shows the enlarged section of the proposed perimeter wall.

Conclusion

With the shortage of suitable reclamation fill, alternative methods of creating land in land-scarce Singapore is necessary. The knowledge gained from creating land below sea level would be pertinent to Singapore in resolving potential problems that may arise from global warming. This knowledge is marketable in consultancy services. Due to the high construction costs for underwater container terminal and underwater city, selection of optimum structural systems and optimum construction methods for quaywalls, water barriers, basement floors etc. is crucial. Further studies / researches on these very important aspects are recommended.

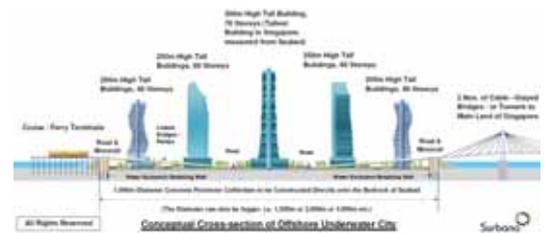


Fig. 5: Section of Offshore Under-Water City

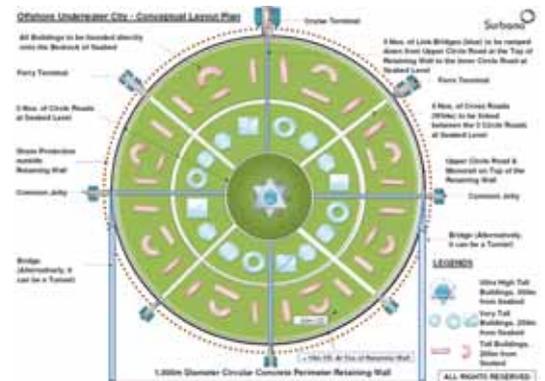


Fig. 6: Layout plan of Offshore Under-Water City

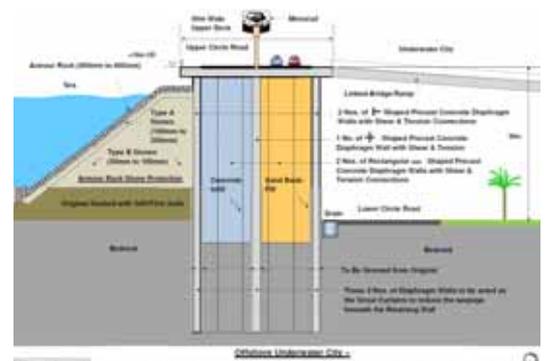


Fig. 7: Enlarged cross-section of perimeter wall of Offshore Under-Water City

One-Day Seminar on Underground Structures

The Institution
of Structural
Engineers

Organiser: IES/IStructE Joint Committee
Date : Thursday, 19 May 2011
Time : 8.30 am to 5.30 pm
Venue : Auditorium, NUS Shaw Foundation Alumni House
 11 Kent Ridge Drive, Singapore 119244
Fees : \$150.00 (IES or IStructE Members)
 \$200.00 (Non-Members)
 \$20.00 (Students)

CPD: 7 PDUs
 STU for RE/RTO: 7 STUs

Fees are inclusive of 7% GST, seminar notes, lunch and light refreshments

Introduction

Underground and related structures, i.e., the underground MRT tunnels, MRT stations, underground expressways, underground shopping malls, underground car parks, underground rock caverns etc. are of great significance to the local construction industry. These structures have to be built below ground because of the limited land space available in Singapore and/or because of strategic reasons. Their planning, design and construction are of great importance to those in the construction professions involved in these structures.

To design and build these complicated and expensive underground structures, optimum solutions are being sought in order to secure the projects by the consulting firms and construction companies. Furthermore, lowest construction cost, shortest possible construction period and approved quality of work are some of the main objectives of the contractors and consultants involved. In view of these, the Seminar Organizing Committee have invited an eminent professor, renowned international consultants, and experienced contractors in Singapore and from overseas to share their knowledge and experiences in the design and construction of underground structures with Singapore's consulting and construction engineers.

Seminar Programme

Time	Topic
8.30 – 9.00 am	Registration
9.00 – 9.15 am	Welcome Address by Prof Wang Chien Ming, Chairman of IES/IStructE Joint Committee
9.15 – 10.15 am	Building Underground In Singapore – Opportunities and Challenges (Prof Lee Fook Hou, Department of Civil & Environmental Engineering, NUS)
10.15 – 10.30 am	Tea-Break
10.30 – 11.30 am	Speaker and Topic to be confirmed (Dr Wen Dazhi / Dr Jeyatharan Kumarasamy, LTA)
11.30 – 12.15 pm	Design of Cost Effective Cut and Cover Tunnel Excavations (Mr John Davies, Leader, Arup Infrastructure Group)
12.15 – 1.15 pm	Lunch
1.15 – 2.45 pm	Design Procedures for Excavations and Lateral Support of Basements (Mr Jack Pappin, Director, ARUP)
2.45 – 3.00 pm	Tea-Break
3.00 – 4.00 pm	Underground Rock Cavern Development (Mr Tan Wooi Leong, Vice President, Oil & Gas, Jurong Consultants Pte Ltd)
4.00 – 5.15 pm	Design and Constructions of C855 (Er Chu Chiang Yong and/or Dr Zhou Han Bin, Woh Hup)
5.15 – 5.30 pm	Closing Remarks by Er. Dr Ho Kwong Meng, Vice-Chairman, IES/IStructE Joint Committee
5.30 pm	End of Seminar

Registration

Please contact Ms. Angela Loke for more information or registration. Her Tel: (65) 6516 5408 Fax: (65) 6775 4710 or E-mail: esplmh@nus.edu.sg



The Pink Hats



In the continuing series of “The Pink Hats”, we feature yet another lady structural engineer who adds vibrancy to our construction industry. We salute all the lady engineers for their contributions and achievements!

Er. Jessica Lim, P.E.

Er. Jessica Lim is one of the Directors in RSP Architects Planners and Engineers. She has been working in RSP since she graduated from NTU 1987. RSP has given her many opportunities to work on various types of building projects ranging from residential, commercial, industrial and institutional. Some of these major projects in Singapore are the Ion Orchard (in the heart of bustling Orchard Road above the Orchard MRT station), Upgrading of Singapore Changi Airport Terminal 2, NTU One-North Campus and Alumni Club located at the Business Hub of Biomedical and Ardmore Park Condominium (an up-market residential development).

What is the job scope in RSP Architects Planners and Engineers?

Jessica: My job as a consulting structural engineer forms a vital part of the entire construction process although we are not so visible in the eyes of public as we operate more at the back stage. As a structural engineer, I develop the skeleton of the building through engineering solutions and optimization of the structural systems in response to the design goal and embrace Architect intent and Client’s brief. I conduct value engineering and carry out pre and post contract administration of construction of the project. Besides that, it is also my responsibility as a management staff to nurture and motivate my colleagues to maximize their contribution and potential.

What are you currently busy with at work?

Jessica: At the moment, I am overseeing condominium projects, public housing development, school upgrading projects in Singapore and residential projects in Vietnam. I am also assisting potential clients in recent land tender exercises.

Why is structural engineering a profession to be in?

Jessica: Structural Engineering is indeed a profession that makes use of engineering knowledge and experience to accomplish a structural project. Besides that, an engineer has to know how to balance quality, cost and time in design and execution of projects. I find fulfilment in overcoming challenges, solving problems and achieving the goals of the projects. I feel satisfied when a project is successfully completed and the occupants enjoying the structure.

What is your advice for young engineers?

Jessica: Young engineers must be keen to learn and have a positive attitude. They should be trained to be analytical, logical and flexible in their thinking. There is no short cut process. Working in a consultant firm, an engineer must go through the entire process from inception till completion of a project. It typically takes three years or more to go through a complete cycle of a project. Regardless the types, the sizes and even an additional and alteration project, every project is unique. We must master the knowledge and the skill to provide excellent design solutions and to overcome the constraints.

How do you balance your work and family life?

Jessica: As a director of the firm, time management is essential. Being resourceful, resilient and with good planning and team work, I am able to spend my time more efficiently in office. The heavy workloads do take away time from me to spend with my three children. Normally, I spend about 3 hours with my children in the weekday and I like to keep the weekends free for them.

IStructE Members' / Appreciation Night "M" Hotel, Friday, 2nd September, 2011

The Organising Committee of the IES/IStructE Joint Committee has confirmed the date of the Annual Members'/Appreciation Night. This year, Members'/Appreciation Night - 2011 will be held at "M" Hotel on Friday 2nd September 2011. A sumptuous buffet dinner will be provided free of charge to IStructE members.

Members'/Appreciation Night - 2011 provides a great opportunity for corporate members of IStructE Singapore Division to interact with each other in a relaxed atmosphere and to receive updates on activities ahead. It is also an opportunity for the Joint Committee to obtain members' feedback on activities to meet members' needs.

Speakers for the evening are Dr. Ng How Yong from National University of Singapore who will give a short lecture on water reclamation and Mr Keong Liam Lim from Arup Singapore Pte Ltd who will speak on motor-racing.

Members need to register early as there are only 70 places available and successful registration will be on a first-come-first served basis.

Time: 19:00 - 22:00pm, 2nd September 2011

Venue: Anson III & IV Function Rooms, Level 2, M Hotel Singapore
81 Anson Road, Singapore 079908

Registration

Please contact Ms. Angela Loke for more information or registration
Her Tel: (65) 6516 5408 Fax: (65) 6775 4710
E-mail: esplmh@nus.edu.sg



6th IStructE Asia-Pacific Forum on Structural Engineering for Extreme Events

Thursday 7 July 2011

Griffith University, Gold Coast, Queensland, Australia

About the Forum

The Asia-Pacific Forum is an annual one-day event held in various centers around Asia. The Forum was established in 2005 to provide a focused high quality series of presentations for the practicing structural engineer over a single day. The 2011 Forum theme is "Structural Engineering for Extreme Events" and is being hosted by The Institution of Structural Engineers – Australia Division. The eminent speakers for the forum include:

- Tom Connor (Aus) – Incorporating Climate Change Adaption into Extreme Event Design
- Justin Leonard (Aus) – Bushfire Disasters & Structures: Structural Engineering Improvements
- Paul Grundy (Aus) – Mitigating Disaster on Coasts
- Des Bull (NZ) – Earthquakes and the Effects on Structures
- Kenny Kwok (Aus and HK) – Behaviour of Tall Buildings and Structures in Strong Winds
- John Carpenter (UK) – Safety, Risk and Failure: the Management of Uncertainty
- Rade Musulin (Aus and US) – Tropical Cyclone Damage Risk Insurance and the Building Envelope
- Mike Fordyce (Past President of IStructE) will provide a summary of the day's presentations.

There are opportunities available for sponsors to the forum. If you are interested in receiving a Sponsor Pack or have further queries, please contact David Donnan (david.donnan@arup.com).