



# Workshop on PCE Candidates: Technical Paper (Mechanical)

Presented by:

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Workshop 3: 23<sup>rd</sup> August 2023



Miami 2,  
MATRADE Exhibition & Convention Centre



# PART B – Mechanical Paper 1 & 2

CATEGORY	WEIGHTAGE
AIR-CONDITIONING & MECHANICAL VENTILATION	40%
FIRE PROTECTION	30%
HYDRAULICS (COLD WATER & SANITARY PLUMBING)	20%
MISCELLANEOUS (LIFT. GAS, ETC.)	10%

# Mechanical Syllabus Outline - 1

## A. Relevant Regulations

- Street, Drainage and Building Act 1974
- Uniform Building By-Laws 1984
- Factories and Machinery Act 1967
- Occupational Safety and Health Act 1994
- Fire Services Act 1988 and Regulations
- Water Services Industry Act 2006 and regulations



# Mechanical Syllabus Outline - 2

## **B. Air-Conditioning and Mechanical Ventilation**

- Basic refrigeration cycle and psychometric chart
- Types of air-conditioning systems and local applications
- Air-conditioning design considerations
- Mechanical ventilation systems and design
- Smoke control and pressurization systems
- Energy conservation considerations



# Mechanical Syllabus Outline - 3

## C. Fire Protection

- Fire safety requirements for buildings
- Design considerations and standards for
  - Wet systems such as hydrants, Wet / Dry risers, Hose reels, Automatic sprinklers, etc.
  - Dry systems such as fire alarm and detection, firemen intercom, fire annunciation, CMS, etc.
  - Fixed gaseous extinguishing systems,
  - Emergency power, lighting, exit signs,
  - Fire lifts
- Submission to Bomba for design and installation approval



# Mechanical Syllabus Outline - 4

## D. Hydraulics

- SPAN Uniform Technical Guidelines
- Cold water supply, storage and distribution
- Hot water generation and circulation
- Sanitary and waste plumbing
- Booster pumps, sewage pumps and accessories
- Submission to water licensees such as Syabas
- Submission to local authorities for sanitary



# Mechanical Syllabus Outline - 5

## **E. Other Systems**

- Lifts and escalators
- LPG / natural gas storage and distribution
- Submissions to JKKP
- Submissions to Suruhanjaya Tenaga dan Gas



## PART B: Mechanical Paper 1 - SAMPLE QUESTION

Q1. Which of the following is not applicable for active fire designs?

- A. MS 1472
- B. MS 1780
- C. MS 1910
- D. MS 1525
- E. Guide to Fire Protection in Malaysia

[Design codes for Mechanical Services]





## PART B: Mechanical Paper 1 - SAMPLE QUESTION

Q2. Which of the following requirement not stipulated in the UBBL or SBO is not true?

- A. Smoke spill system must be provided for any fire compartmented area exceeding 1,000 m<sup>2</sup>
- B. The first stage wet riser tank cannot be installed above the ground floor
- C. Sprinkler tank may be installed at roof level
- D. A wet riser system cannot contain more than 4 riser stacks
- E. A hose reel system cannot contain more than 8 riser stacks

[UBBL & Bomba]

## PART B: Mechanical Paper 2 - SAMPLE QUESTION

Q1. You are appointed to design the air conditioning and mechanical ventilation system for the retrofit of a 20-year old, 25-storey Office Building with a nett rentable area of 1500m<sup>2</sup> per floor. Your client requires for the new air conditioning system to have minimum running costs and with flexibility to cater for after normal office-hour occupation by some of the tenants.

List the types of air conditioning systems you would consider and recommend. Elaborate the reasons for your recommendation and how you would ensure compliance to current local authority requirements. Also list down specific areas not within your responsibility and capability where you need your client to seek expert advice.

[ACMV]

## PART B: Mechanical Paper 2 - SAMPLE QUESTION

Q2. The following complaints have been received from building occupants. Briefly describe what you think are the likely causes of these problems and the solutions you would propose.

- a) Office occupants seating next to window complain of unsatisfactory air conditioning. Your on-site measurement shows the design temperature of 24<sup>0</sup>C DB and 55% RH is achieved.
- b) Hotel guests complain it takes a long time to get hot water from their toilet showers and the water temperature fluctuates during their showers.
- c) The contractor was unable to achieve specified background noise level of NC 25 for the auditorium even though he has followed manufacturer's recommendation of internal duct lining as well as installed silencers.

**[ACMV & Hydraulics]**



# PROFESSIONAL COMPETENCY EXAMINATION (PCE)

## DO'S & DON'TS

Additional Briefing on Paper 2s (Subjective Questions)



Session:  
22<sup>nd</sup> / 23<sup>rd</sup> / 24<sup>th</sup> August 2023



MATRADE Hall,  
MATRADE Exhibition & Convention Centre



## **PART B: Mechanical Paper 2 – PAST YEAR QUESTION**

### **CASE EXAMPLE elaborating the DO's & DON'Ts**

Q3. A completed 500-room city hotel is installed with 3 nos. of 800 RT water-cooled centrifugal chillers. During actual operation, the normal peak cooling load is 1,000 RT while the night load averaged 400 RT.

- a) Discuss the consequence of this chiller configuration.
- b) What would be your most economical solution to improve on the operating performance of the chiller plant if the owner has capex only for one chiller replacement but not any associated equipment? Explain the merits of your decision. Note that there is no plantroom space to house an additional smaller chiller.
- c) If you were to design a similar hotel in future, what would be your chiller configuration and why?

## **PART B: Mechanical Paper 2 – PAST YEAR QUESTION**

### **CASE EXAMPLE elaborating the DO's & DON'Ts**

Q3. A completed 500-room city **hotel** is installed with **3 nos.** of **800 RT** water-cooled **centrifugal chillers**. During actual operation, the normal peak cooling load is **1,000 RT** while the night load averaged **400 RT**.

**(IDENTIFY THE FACTS GIVEN)**



## PART B: Mechanical Paper 2 – PAST YEAR QUESTION

### CASE EXAMPLE elaborating the DO's & DON'Ts

Q3. A completed 500-room city hotel is installed with 3 nos. of 800 RT water-cooled centrifugal chillers. During actual operation, the normal peak cooling load is 1,000 RT while the night load averaged 400 RT.

a) Discuss the consequence of this chiller configuration.

**(UNDERSTAND THE QUESTION AND ANSWER TO THE POINT)**

With the existing configuration, explain the deficiencies faced during operation and why.

(20 marks)





## **PART B: Mechanical Paper 2 – PAST YEAR QUESTION**

### **CASE EXAMPLE elaborating the DO's & DON'Ts**

Q3. A completed 500-room city hotel is installed with **3 nos.** of **800 RT** water-cooled **centrifugal chillers**. During actual operation, the normal peak cooling load is **1,000 RT** while the night load averaged **400 RT**.

- b) What would be your **most economical** solution to improve on the operating performance of the chiller plant if the owner has capex only for **one chiller replacement** but not any associated equipment? Explain **the merits** of your decision. Note that there is no plantroom space to house an additional smaller chiller.

**(PROPOSE YOUR SOLUTION AND WHY)**

**Describe what you would change to achieve better efficiency bearing in mind the constraints and why it is better.**

**(50 marks)**



# Q & A





# THANK YOU



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