# IES Preparation Course for PPE Exam – Air-Conditioning and Mechanical Ventilation Systems (ACMV)



Trainer: Dr Jahangeer K Abdul Halim

## INTRODUCTION

In order to register as a Professional Engineer (PE) with Professional Engineers Board, Singapore, the aspiring Professional Engineers with an accredited Mechanical Engineering degree and sufficient experience as prescribed by the PE Board, Singapore, need to sit and pass the PPE examination.

The PPE examination is the second stage of the three stages of PE registration examinations. The other two stages, the Fundamental Engineering Examination (FEE) and the final interview flank the PPE Examination. As you are aware, over the years, Singapore government have been promoting energy efficiency in the significant energy consuming areas such as commercial and industrial sectors in Singapore to fulfil the World stage commitment of 36% reduction in Carbon Dioxide emission reduction by 2030 (reference year: 2005).

This government objective is reflected even in the recent years' PPE examination emphasising more on the energy efficiency of the mechanical engineering systems like Airconditioning and Mechanical Ventilation (ACMV) systems. This preparatory course aims the aspiring Professional Engineers in the field of Mechanical Engineering to equip with enough practical knowledge to answer all the ACMV related questions, which constitute more than 60% of the total PPE questions, in the PPE Paper 2 examination.

## **PROGRAMME DETAILS**

Date	: 21, 22 & 23 March 2023
Duration	: 3 Days
Time	: 9.00am – 5:30pm
Venue	<ul> <li>IES Academy @ Jurong East Devan Nair Institute, 80 Jurong East St 21 #04-10 Singapore 609607</li> </ul>
Organizer	: IES Academy Pte Ltd
CPD	: 21 PDU (PEB/CEng)
Course Fees	: \$907.20 (IES Members) \$1,134.00 (Non- Members)
Fees are     materials	inclusive of <b>8% GST</b> and course Provision of refreshments i

• Fees are inclusive of **8% GST** and course materials. Provision of refreshments is subjected to prevailing MOH regulations.

• Certificate of Attendance will be given to participants with 100% attendance.

## **LEARNING OBJECTIVES**

Upon completion of this course, the participants should be able to develop good practical understanding of the following with respect to the relevant:

- Chiller Systems
- Mechanical Ventilation Systems
- Building Thermal System (ETTV, RTTV etc.)

## TARGET AUDIENCE

- Aspiring Professional Engineers (Mechanical) sitting for the PPE 2023
- Aspiring Professional Engineers (Mechanical) sitting for the FEE 2023

## **COURSE OUTLINE**

- Fundamentals of Thermodynamics and heat transfer
- Different types of air-conditioning systems
- Chiller systems
- Optimization of Chiller systems
- Fundamentals of Mechanical Ventilation Systems
- Optimization of air distribution systems
- Relevant codes of practice

## **SPEAKER'S PROFILE**

Dr Jahangeer a registered Professional Engineer (Mechanical) with the Professional Engineer Board Singapore, graduated with a Master of Science (M.Sc.) in Mechanical Engineering from National University of Singapore in 1998. He was awarded a Research Scholarship by the National University of Singapore (NUS) in 1999 to undertake a research project on solar energy and was awarded a Master of Engineering (M.Eng.)degree in 2002. After completing his M.Eng. degree, he continued with research and teaching at NUS and his research on evaporatively-cooled condensers of air-conditioning systems led to the award of a PhD. degree in 2013.

Dr. Jahangeer's areas of specialization include air-conditioning and mechanical ventilation systems, combined heat and power systems, steam technologies, steam turbines and boiler systems, compressed air system optimization, building energy simulation and energy optimization. He has also authored chapters in several technical books and research papers in international peer-reviewed journals. He is also an SCEM (Singapore Certified Energy Manager). He is also a Senior Member of Institute of Engineers Singapore (IES since 1999.

Currently, Dr Jahangeer is a Technical Director with LJ Energy Pte Ltd. (an accredited ESCO) providing consultancy services for mechanical and energy Systems including large scale trigeneration systems, boilers and compressed air systems. Dr Jahangeer has also been providing training for local and international practising engineers from the mechanical and energy services sector including the Singapore Certified Energy Manager (SCEM) professional candidates. He along with his colleague has already trained more than 1000 industrial professionals as Singapore Certified Energy Managers (SCEMs) since the inception of the SCEM.

# Program Outline (Day 1)

Day, Date (Time)	Programme Schedule	
Tuesday	IES Academy @ Jurong East	
21 March 2023	Dr Jahangeer	
8:30am – 9:00am	Registration	
9:00am – 10:30am	SS530 - Code of practice for Refrigerants energy efficiency standard for building services and equipment Types of air conditioning systems 2014	
	Introduction Vapour compression cycle Refrigerants Absorption cycle Types of air conditioning systems Central air conditioning systems Types of chillers Efficiency ratings Illustrative Examples	
10:30am – 10:45am	Tea-Break	
10:45am – 12:45pm	SS553 - Code of practice for air - conditioning and mechanical ventilation in buildings 2016 Chillers Use of economisers & sub-cooling Air cooled and water cooled Chiller efficiency and life cycle cost Sizing & configuration Illustrative Examples	
12:45pm - 1:45pm	Lunch	
1:45pm – 3:45pm	Chillers Consolidation of chiller plant Chiller sequencing Optimising strategies Free cooling Illustrative Examples	
3:45pm – 4.00pm	Tea-Break	
4.00pm – 5:30pm	Thermal storage systems Types of systems Operating strategies Illustrative Examples	

# Program Outline (Day 2)

Day, Date (Time)	Programme Schedule			
Wednesday	IES Academy @ Jurong East			
22 March 2023	Dr Jahangeer			
8:30am – 9:00am	Registration			
9:00am – 10:30am	Pumping Systems Types pumping systems Pump & system characteristics Affinity laws Pump sizing Constant flow vs variable flow systems Pressure losses in equipment Illustrative Examples			
10:30am – 10:45am	Tea-Break			
10:45am – 12:45pm	<u>Cooling Towers</u> Types of cooling towers Performance & sizing of cooling towers Capacity control Installation of cooling towers Condition of cooling towers Free cooling Illustrative Examples			
12:45pm - 1:45pm	Lunch			
1:45pm – 3:45pm	Air Handling Systems Types of fans and applications System and fan characteristics Filter losses CAV & VAV systems Controls Low face velocity Duel path AHUs Run-around coils Economisers Ventilation controls Illustrative Examples			
3:45pm – 4.00pm	Tea-Break			
4.00pm – 5:30pm	Air Handling Systems Economisers Ventilation controls Illustrative Examples			

# Program Outline (Day 3)

Day, Date (Time)	Programme Schedule						
Thursday	IES Academy @ Jurong East						
23 March 2023	Dr Jahangeer						
8:30am – 9:00am	Registration						
9:00am – 10:30am	Air Conditioning Space Condition & Psychrometric Chart Air-conditioning space requirements Psychrometric chart Psychrometric parameters Determination of Air Properties Sensible heating Sensible cooling						
10:30am – 10:45am	Tea-Break						
10:45am – 12:45pm	Air Conditioning Space Condition & Psychrometric Chart Sensible cooling Mixing of air streams Dehumidification Processes involved in AHU and space Indoor Air Quality Air Changes Requirement Illustrative Examples						
12:45pm - 1:45pm	Lunch						
1:45pm – 3:45pm	Building Envelope Thermal Transfer Values Heat Transfer modes Thermal Resistance Overall Heat Transfer Coefficient (U Value) Envelope Thermal Transfer Value (ETTV)						
3:45pm – 4.00pm	Tea-Break						
4.00pm – 5:30pm	Building Envelope Thermal Transfer Values Roof Thermal Transfer Value (RTTV) Residential Envelope Transfer Value (RETV) Illustrative Examples						



## **REGISTRATION FORM**

# IES Preparation Course for PPE Exam - Air-Conditioning and Mechanical Ventilation Systems (ACMV)

Dates of Course	:	21 – 23 March 2023	3 (Tuesda	ay -	- Thursday)					
Course Time	:	9.00am to 5.30pm								
Venue	<ul> <li>IES Academy@Jurong East</li> <li>80 Jurong East Street 21, #04-10</li> <li>Devan Nair Institute (e2i), S(609607)</li> </ul>									
Course Fee	:	\$907.20 (IES Mem	nbers) /	\$1,	,134.00 (Non	- Meml	pers)			
CPD Programme	:	21 PDU (PEB/CEng)								
Course Coordinator	:	Nancie Neo Email: nancie.neo@	)iesnet.o	rg.	sg					
Closing Date	:	10 March 2023 or v	vhen full <sup>,</sup>	y re	egistered					
Participant's D	etails									
Name :						NRIC/I	FIN No		:	
Company :						Design	ation		:	
Address :	s :									
						Postal	Code	:		
Mobile :	Office :				Fa				:	
Email :										
Please	IES No:         RE/RTO No:         PE No:						PE No:			
if any	Non Members     Company			Company S	ponsor			Vegetarian meal		
Contact Person's Details (If different from participant)										
Name :						Design	ation		:	
Mobile :			Office	:				Fax		:
Email :										
Payment Details	Cheque (if any):				Amour	nt:				
*Payment via PayNow/Bank Transfer available. Please email to enquire. *All course fees are inclusive of <b>8%</b> GST, course materials and Halal-certified refreshments. *Certificate of Attendance will be issued to participants with 100% attendance.										
Acceptance of Terms & Conditions for Registration of IES Academy's Courses/Events I agree to abide by the Terms and Conditions for Registration of IES Academy's courses/events.										
I agree to abid Name:	e by tl	ne Terms and Condit	ions for	Re	gistration of IE	S Acade	my's co	ourses	s/e	vents.

#### **TERMS & CONDITIONS ON COURSE REGISTRATION**

#### Registration

Any registration, whether on-line or fax will be on a *first-come-first-served basis* and will only be confirmed upon receipt of full payment by IES Academy Pte Ltd unless otherwise invoice to company. All registrations must be submitted with duly completed registration form.

### **Closing Date & Payment**

The closing date of the event will be 1 week prior to event commencement date or earlier. Payment via Bank Transfer, PayNow, AXS available. Cheques should be crossed 'A/C payee only' and made payable to 'IES Academy Pte Ltd', with the Title of The Event indicated *clearly written on the back of the cheques,* and submitted with the duly completed registration forms to:

> Attn: Nancie Neo IES Academy@Jurong East Devan Nair Institute for Employment and Employability, 80 Jurong East Street 21, #04-10 Singapore 609607

### **Confirmation of Registration**

Confirmation of registration will be given at least 1 week before the commencement date via email. If you do not receive the said confirmation email, you are required to contact IESA at 6463 9211 during office hours.

IESA reserves the right to allow only confirmed registrants to attend the Event.

#### Withdrawals/Refunds of Fees

- $\triangleright$ Written notice at least 1 week in advance before the commencement of the event
- $\geq$ Full course fee shall be refunded subjected to 4.5% transaction charge.
- $\triangleright$ **NO** refund otherwise.
- $\geq$ No show of participant would not be accepted as a valid reason for withdrawal/refund.
- $\triangleright$ One time replacement is allowed only if written notice is received by us at least 1 week before the commencement of the event. However, when an IES member is replaced by a non-member, the participant has to pay the difference in the relevant fees.

#### Cancellation/Postponement

Changes in Venue, Dates, Time and Speakers for the Events can occur due to unforeseen circumstances. IES reserves the full rights to cancel or postpone the Event under such circumstances without prior reasons. Every effort, however, will be made to inform the participants or contact person of any cancellation or postponement.

Fees will be refunded in FULL if any Event is cancelled by IESA.

#### PERSONAL DATA PROTECTION ACT

I consent to the processing by Institution of Engineers, Singapore of personal data, including sensitive personal data as defined in the Data Protection Act 2014, about me for the proper purposes of Institution of Engineers, Singapore (IES). I undertake to observe the provisions of the Data Protection Act 2014 in relation to any personal data I may myself hold and process as a Members of Institution of Engineers, Singapore, and I agree to indemnify Institution of Engineers, Singapore from liability for any claims or damages that may arise from the processing of this data. For more information kindly refer to here.

#### Enquiries

For further enquiries, please contact IESA general office at Tel: 6463 9211.