IES PREPARATION COURSE
FOR
PPE PART2 EXAM ELECTRICAL ENGINEERING
STANDBY POWER GENERATING SYSTEMS

PROGRAMME DETAILS

Date	**: 6 May 2021 (Thursday)**
Duration	**: 6 Hours**
Time	**: 9am – 3pm**
Venue	**: IES Academy @ Jurong East (Devan Nair Institute, E2i Building)** **80, Jurong East Street 21 #04-10, Singapore 609607 (Near Jurong East MRT)**
Fees *	**: $321.00 (IES Member), $374.50 (Non-Member)**

- *Inclusive of 7% GST and course materials..*
- *Certificate of Attendance will be given to participants with 100% attendance*

INTRODUCTION

When continuity and reliability of utility supply problems to a facility site are discussed and considered, most people immediately think of total blackout. When that happens, everything stops; facility goes down and in total darkness.

To ensure greater reliability and continuity of an AC power supply, many commercial and industrial facilities depend on two separate utility services or one utility service plus on-site standby power generation. The diesel engine-generator is the classic standby power generation system and is widely used in industry. It provides economical protection against prolonged power outage. In short, standby power generating systems are used to protect a facility against loss of productivity resulting from utility power outage.

OBJECTIVES

The course aims to provide participants with a thorough knowledge and understanding of how standby power generating systems operates through an automatic transfer switch monitors the AC voltage coming from the utility line for power failure conditions.

Upon detection of an outage for a pre-determined period of time, the standby generator is started. After the generator is speed up to the rated speed, the load is transferred from the utility to the generator. Upon return of the utility feed, the load is switched back and the generator is stopped.

Once this basic concept is understood, various standby power supply options will be examined and discussed. Thereafter, selection of a suitable generating set and determination of its output and input power and therefore the engine output in HP can be calculated and determined.

Other topics of importance such as electrical equipment of diesel engine, engine cooling and engine room ventilation requirements, air requirements without engine cooling air, generator's waste heat, combustion air, fuel oil supply to diesel engine, daily service tank, storage tank, fuel pumps, electrical switchgear and automatic control panel will be fully discussed.

COURSE OUTLINE

The topics to be discussed will include but not limited to the following:

- Effects of utility power failure
- Standby power supply options
- The classic standby power system using an engine generator set with
    - Contactor type, break before made unit automatic transfer switch OR
    - Using a static transfer switch to transfer the load from utility feeder to generator
- The dual utility feeder system
    - an automatic transfer switch changes the loads from main utility line to the standby line in the event of a power failure or interruption
- Dual utility feeder system with bus-tie interlocking circuit breaker
- Peak power sharing
    - the use of a diesel generator for standby power and peak power shaving applications

      The automatic overlap (static) transfer switch changes the load from the utility feed to the generator instantly so that no disruption of normal operation is encountered
- Selection of suitable generating set

- Determination of output power
    - Electrical loads (essential and less essential loads)
    - Motors with shock load characteristics
    - Coincidence factor and power factor
    - Starting torque and starting current of induction motors and its influence on the generating set
    - Formula for output calculation of generating set
    - Approximate cost estimates
- Governing the speed of a generating set
    - Speed governor
    - Speed behaviour
- Electrical equipment of diesel engine
    - Starting system
    - Manual system
    - Compressed air start
    - Electrical starting equipment
    - Batteries
    - Loss of battery capacity when starting
- Engine room requirements
    - Foundation and vibration damping
    - Noise Problems
    - Location of engine room
- Engine cooling requirements
    - Different types of cooling systems
    - Air cooling
    - Closed circuit water cooling with fan or radiator cooling
    - Fan cooling with radiator installed separately from engine generating set
    - Indirect water cooling with heat exchanger and water pump mounted on engine
    - Mixture cooling with mixture tank and addition of fresh water
    - Calculation of water consumption
- Engine room ventilation
    - Air requirement without engine cooling air
    - Radiant heat of diesel engine
    - Generator waste heat
    - Air changes
    - Influence of ambient conditions
    - Combustion air and exhaust system

- Fuel oil supply to diesel engine generating set
    - Daily service tank
    - Storage tank (above and underground)
    - Fuel pumps
- Electrical switchgear and control panel
    - Normal equipment
    - Fully automatic control panel and its functions
- The schematic single line wiring diagram of control arrangement of main contactor and generator contactor
    - Voltage regulation
    - Frequency regulation
    - Control and monitoring
    - Transfer switches or contactors
    - Open Transition Transfer (OTT)
    - Closed Transition Transfer (CTT)
    - Transfer switches or contactors
    - Use of 3 poles or 4 poles?

TARGET AUDIENCE

This course should be of interest to all Electrical installation designers, Electrical engineers from the installation and contracting industry, Plant Electrical Engineers from Industrial Sector as well as LEWs and any interested parties. This course will benefit greatly those young Electrical Engineers and individuals who are aspiring to be Professional Engineers as well as those who are preparing to sit for the Practice of Professional Engineering Examination part 2 (Electrical). Standby Power Generating Systems is one of the main topics in the syllabus of the PPE examination Part2.

CV OF SPEAKERS

Er. Lee Keh Sai
DFH MIEE CEng PEng

Er Lee Keh Sai is a Chartered Electrical Engineer and a Registered Professional Engineer with more than 50 years of industrial experience. He specializes in Electrical Power Engineering, Energy Management and Power Quality Solutions.

Er Lee is the Principal of K.S.Lee & Associates which he established in 1970. He has provided consultancy services to many MNC and SMEs. Prior to the establishment of his consultancy services, he held senior staff positions in the Electricity Department of the former Public Utilities Board and later with Shell Eastern Petroleum at their Pulau Bukom Refinery Complex.

Er Lee has served in various capacities in many professional associations, government agencies and educational institutions. He had previously served as Deputy Chairman, Board of Governors, for both the ITE and Singapore Polytechnic. He is currently serving as a member of Strata Titles Board and EMC ‘s Market Survellance Compliance Panel.

Er Lee is an approved and certified trainer and is currently teaching the core module “Motor Driven Systems” under the Singapore Certified Energy Managers (SCEM) Program.

Registration Form

IES PREPARATION COURSE FOR PPE PART2 EXAM ELECTRICAL ENGINEERING: STANDBY POWER GENERATING SYSTEMS

Date : 6 May 2021, Thursday
Time : 9am – 3pm
Venue : IES Academy@Jurong East (Devan Nair Institute, E2i Building)
80 Jurong East Street 21, #04-10 Singapore 609607
Fees (Include GST): IES Members: $321.00
Non-Members: $374.50

Please register online/fax the completed form by **03 May 2021 before 3pm** to:
Contact Person: **Joel Chua (joel.chua@iesnet.org.sg)**
Address: **80 Jurong East Street 21, #04-10 Singapore 609607**
Tel: **64639211**

Participant Details

***Name** : _____ ***NRIC** : _____
(Please written in BLOCK Letter)

Company : _____ ***Designation** : _____

***Address 1** : _____
(For mailing of invoice and receipt)

Address 2 : _____
(For mailing of Certificate)

***Postal Code** : _____ **Sex** : Male / Female

***Contact No.** : _____ **Fax** : _____

***Your Email** : _____
(For sending of confirmation email, preferable personal unless company sponsored)

Please indicate : ❑ IES members IES M'ship No.: _____
❑ Non-members

Contact Person Details *(if different from participant)*

#Name : _____ Designation: _____

#Tel : _____ Fax: _____

#Email : _____

Payment Details

Bank / Cheque No.: _____ Amount ($): _____

❑ Sponsored by company

* All Fees are inclusive of 7 % GST.

* Cheque should be made payable to: "IES Academy Pte Ltd".

Acceptance of Terms and Conditions for Registrations of IES Academy's Events

I agree to abide by the Terms and Conditions for Registration of IES Academy's Events

Name : _____ Signature : _____

Mandatory entry
#Compulsory Entry for participant who choose to be INVOICED to your company

TERMS & CONDITIONS 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. 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:

Attention to: Joel Chua (Mr.)
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

Written notice ***at least 1 week in advance*** before the commencement of the event

Full course fee shall be refunded subjected to 4.5% transaction charge.

- **NO** refund otherwise.

No show of participant would not be accepted as a valid reason for withdrawal/refund.

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.