Subject Description Form

Subject Code	**BSE3123**
Subject Title	**Power Distribution**
Credit Value	3
Level	3
Pre-requisite Co-requisite Exclusion	BSE2123 or BSE2130 or equivalent. Nil Nil
Objectives	The objectives of this subject is to enable students to: 1. recognize and apply the design approaches and principles for power distribution in and around buildings; and 2. identify the requirements for safety, efficiency and reliability of electrical installations as manifest in supply rules, regulations, codes, etc.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) select appropriate electrical equipment or components for typical low-voltage distribution systems; b) determine appropriate settings or ratings or sizes of electrical equipment or components in low-voltage distribution systems; c) design typical low-voltage distribution systems in high-rise buildings according to prevailing principles and practices contained within international codes and standards; and d) analyze the operation of systems under starting, steady-state and transient fault conditions, to ensure safe operation and system integrity.
Subject Synopsis/ Indicative Syllabus	**Power supply and distribution**: system planning, reliability, maintenance, environmental considerations. Supply arrangements for domestic, commercial and industrial installations. Tariffs, maximum demand, load factor and diversity. Electricity Ordinance, IEE regulations, local supply rules. **Earthing systems**: classification and concepts of earthing and bonding; connections to ground, earth return. **Protection for safety**: electric shock risk, residual current devices, earthed equipotential bonding and automatic disconnection; Thermal and fire risk, arcing, overheating, etc. **Power system modelling and analysis**: modelling supply and distributions system. Fault calculations, symmetrical component analysis, equivalent circuits. **Overcurrent protection:** overcurrent, short circuit and earth fault protection. Protective devices: selection and settings, coordination and discrimination. **Installation design:** switchboards, IDMT relay setting, busbar systems, protective conductors. Design of distribution circuits, final circuits, etc. Design and protection for motor circuits. **Emergency and standby supplies –** Statutory requirements. Standby generator: sizing and selection, transient performance, starting characteristics. **Metering and power factor**: power and energy measurement principles and practices. Power factor correction, sizing of capacitor banks and setting of controllers.
Teaching/Learning Methodology	The teaching methods include case studies and working through design examples, with emphasis on applying technical data, regulations, standards and guidance notes prepared by various statutory bodies and others. Student participation is expected in problem solving of selected examples in tutorial work, including calculation questions and longer open ended problems. Assignment work includes problem solving and open-ended design exercises. Mini design group projects are assigned to students with the supervision and guidance of teaching

staff. All tasks will be set on a typical floor or selected areas of a building, and are related to electrical load estimation and power distribution.

Laboratory work is an integral part of this subject to serve as a vehicle for contrasting theory with practice, and provide students familiarity with equipment and testing techniques. Laboratory sessions will be jointly organized together with other technical subjects in Level 3 of the programme, but will be assessed as part of this subject.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d		
In-class test, mini design project and laboratory work	40	✓	✓	✓	✓		
Coursework*	60	✓	✓	✓	✓		
Total	100						

* For details, please refer to the 2020/21 Semester 1 Subject teaching scheme/schedule.

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

The understanding of the electrical installation principles can be effectively assessed using in-class test, mini design project and written examination with appropriate electrical design and system analysis problems. The hands-on laboratory work can assess the practical knowledge of electrical equipments and systems.

Student Study Effort Expected		
	Class contact:	39 hrs
	▪ Lectures	24 Hrs.
	▪ Tutorials	8 Hrs.
	▪ Laboratory	6 Hrs.
	▪ In class assessment	1 Hrs.
	Other student study effort:	
	▪ Self study	81Hrs.
	Total student study effort	120 Hrs.

Reading List and References

Practical Power System Protection, Newnes, 2005

Requirements for electrical installations : IEE wiring regulations, 2011

EMSD COP for the electricity (wiring) regulations, 2009

CIBSE Guide K: Electricity in Buildings, Norwick: CIBSE**,** 2004

Günter G. Seip, LV electrical installation handbook, Wiley, 2000

C. Shelton, Electrical installations, Cheltenham : Nelson Thornes, 2004

Commentary on BS7671, London : Institution of Electrical Engineers, 2002