

Subject Description Form

Subject Code	BSE515
Subject Title	Electrical Installations in Buildings
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil (recommended background knowledge: electrical technology)
Objectives	<p>To provide practicing engineers with thorough knowledge and critical appreciation of electrical installation design and operation in modern, large high rise buildings and complexes.</p> <p>The emphasis will be on design methodology for safe and economic system performance, building energy efficiency, and troubleshooting of operation problems. A critical review of current practices with a view to developing a total design approach, which integration and co-ordination aspects will be emphasized. The subject will place emphasis on efficient supply, distribution and utilisation of electrical energy in buildings.</p>
Intended Learning Outcomes	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> a. appreciate the issues of safety, reliability and energy efficiency in electrical installations; b. perform calculation for electrical installation design according to wiring regulations; c. select appreciate electrical equipment, and determine setting or rating of such equipment in typical electrical installations; d. analyze system performance under different operating conditions, and diagnose design and operation problems.
Subject Synopsis/ Indicative Syllabus	<p>HV supply and distribution in buildings: Switchgear, distribution, control, protection schemes, HV and LV co-ordination protection.</p> <p>Review of design and operating objectives and criteria: Electricity supply ordinance, rules, codes and regulations affecting supply and utilization of electricity.</p> <p>Electric safety: Nature and mechanisms of electric shock, assessing electric shock risk, isolation, earthing and bonding principles and practices.</p> <p>Lightning protection: Lightning parameters, methods of protection and design, lightning protection system earthing and bonding.</p> <p>Fault calculation for LV systems: Phase fault and earth fault, calculation methods, data for fault current calculation.</p> <p>Overcurrent protection: for large plants, cabling systems, motor drives, etc. sizing electric conductors, earth fault protection, selection of equipment.</p> <p>Protective devices: Operating characteristics of protective devices, such as,</p>

	<p>fuses, MCBs, MCCBs, ACBs, and RCCBs, selection, application and operation of protective devices, backup protection, coordination and discrimination.</p> <p>Standby generation: Dynamic analysis of engine/generator, load profiles, generator selection, sizing, earthing and bonding, requirements for the fire services systems.</p> <p>Harmonics: Harmonics generation in LV systems, problems caused by harmonics, harmonics analysis, mitigation methods and application.</p>																																														
<p>Teaching/Learning Methodology</p>	<p>In this subject students are required to extensively use design codes and data, published journal articles, research studies, etc. to evaluate economics, flexibility in planning, design, and operation problems. Case studies of buildings, systems and equipment are presented in lectures and tutorials will also be held regularly to equip students with the understanding of technical matters and the more complex engineering concepts. Students are required to carry out an independent study on a particular issue encountered in the design, operation and maintenance of electrical installations, and to present the results orally and submit a written report.</p>																																														
<p>Assessment Methods in Alignment with Intended Learning Outcomes</p>	<table border="1"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</th> <th colspan="6">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th>a.</th> <th>b.</th> <th>c.</th> <th>d.</th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>1. Homework/Test</td> <td>30%</td> <td></td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>2. Seminar</td> <td>10%</td> <td>✓</td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>3. Examination</td> <td>60%</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td>100%</td> <td colspan="6"></td> </tr> </tbody> </table> <p>Homework is assigned to students whenever a topic is covered and tutorial is given. This ensures students gain knowledge in pace through the lectures and tutorials. Students are also asked to select one topic and discuss critical issues faced in the electrical installations, and tested whether they actually gain the knowledge or not. The final examination reflects the overall learning performance of the students in this subject.</p>	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)						a.	b.	c.	d.			1. Homework/Test	30%		✓	✓	✓			2. Seminar	10%	✓			✓			3. Examination	60%	✓	✓	✓	✓			Total	100%						
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<p>Reading List and References</p>	<p>CIBSE Guide K: Electricity in Buildings. ([QRT] TH7225.C5v. K)</p> <p>Commentary on BS7671. (TK3271.C66)</p> <p>Electrical installations handbook. (TK3271.E4313)</p> <p>EMSD COP for the electricity (wiring) regulations, latest edition.</p> <p>Handouts and other distributed material.</p> <p>IEE wiring Regulations, latest version.</p> <p>LV electrical installation handbook. (TK3201.W66)</p> <p>Power system harmonic analysis by Arrillaga, J. (TK3226. P378)</p>																																														

	<p>Power system protection Vol 1& 2. (TK 3226.E43)</p>
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Protective Relays: Application Guide.