

UNIVERSITY COLLEGE LONDON

University of London

EXAMINATION FOR INTERNAL STUDENTS

For the following qualifications :-

M. Sc.

ESGL3: Lighting: Current Research Issues

COURSE CODE : ENVSGLO3

DATE : 10-MAY-02

TIME : 10.00

TIME ALLOWED : 3 hours

02-C0454-3-40

© 2002 University of London

TURN OVER

UNIVERSITY OF LONDON

MSc DEGREE IN BUILT ENVIRONMENT 2002
for Internal Students of University College London

ESGL3: Lighting: current research issues

Answer **FOUR** questions.

All questions carry equal marks. Use annotated sketches.

1. Lynes¹, reviewing the work of Judd, defines the following ways in which light and colour may be experienced:
- the *surface* mode, in which the stimulus is perceived as the coloured surface of an object
 - the *volume* mode, in which colour is seen in depth behind the surface, as in a coloured transparent medium
 - the *illuminant* mode, in which light and colour are perceived as emerging from a self-luminous body, such as a fluorescent lamp
 - the *aperture* mode where the source of light or colour is unidentifiable due to lack of visible information
 - the *illumination* mode, in which attention is focused on the composition of the incident light.

With reference to a commercial office environment, lit by both daylighting and electric lighting, outline these modes of appearance in the perception of objects and surfaces in the space. What are the lighting design implications?

¹Lynes J A. Ch. 2. Vision. pp39-40 in Coaton J and Marsden A M (Eds). *Lamps and Lighting*. Edward Arnold, London (1997).

2. Compare the variety of spectral power distributions emitted by lamp types in common use together with that of daylight.
Outline the ongoing research studies that have indicated the effect of ‘blue-rich’ sources on the subjective brightness of interiors.
3. In an extended discussion, review the effects of environmental illumination on melatonin secretion, bodily rhythms and mood states.
Indicate the possibilities for using the results of these studies to improve health and well-being in the workplace.

TURN OVER

ESGL3: Lighting: current research issues *continued*

4. The term 'hyperdensity' has been used to describe the features of urban developments that are reaching extreme levels of density and complexity. Cities such as Manhattan, Chicago and Hong Kong are typical of this trend and such environments are given a visual realisation in the drawings of Archigram and the visions of Ridley Scott 's *Blade Runner* movie.

In considering such developments in the future, describe the modulation of daylight in such environments and the lit environment created. What are the prospects for electric lighting to energize and beautify the urban scene to produce environments that are inclusive for all individuals in society?

5. Frank Lloyd Wright (1869-1959) was closely associated with Modernism in the early stages of his career but as an old man he critically reappraised modernism in favour of 'organic architecture'. In a survey of his work explore the relationship of interior to exterior in his buildings and the creation of lit volumes and spaces. Use representative buildings to illustrate your discussion. Compare his work with other architects who remained faithful to Modernism.

6. Two and three-dimensional visualizations of a proposed lighting design can be effective indicators of lighting design quality. Compare visualizations by manual graphical methods, computer methods and physical models and for each technique comment on:-

1. the accuracy of the technique
2. the ability to manipulate the model to reflect changes to the design
3. the effectiveness of the technique in conveying lit appearance to the client.

7. Lighting research over the past thirty years has identified perhaps five impressions that have been elicited from people in terms of the appearance of the lit space:-

1. *visual clarity* – the ability to distinguish detail
2. *spaciousness* – the perception of spatial volume
3. *preference* – the general evaluation of the space
4. *relaxation* – the lack of tenseness
5. *privacy* – the degree of intimacy.

Indicate how the manipulation of luminance pattern in an interior can affect the generation of these impressions.

8. Subjective brightness in an interior is determined not only by the luminance of the stimulus but by the luminance of the surround areas. Explore the phenomenon of physiological adaptation in this context and describe how this led to Hopkinson's concept of apparent brightness.

END OF PAPER