UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF INDUSTRIAL TECHNOLOGY

FINAL EXAMINATION

JANUARY 2016 SEMESTER

COURSE CODE	:	JFB 40503
COURSE TITLE	:	BUILDING LIGHTING SYSTEM
PROGRAMME LEVEL	:	BACHELOR
DATE	:	30 MAY 2016
TIME	:	2.30 PM – 5.30 PM
DURATION	:	3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.

2. This question paper is printed on both sides of the paper.

3. Answer FOUR (4) questions only.

4. Please write your answers on the answer booklet provided.

5. Table and formula are enclosed as reference.

6. Please answer all questions in English only.

THERE ARE 4 PAGES OF QUESTIONS EXCLUDING THIS PAGE.

Total: 100 marks

INSTRUCTION: Choose FOUR (4) questions only
Please use the answer booklet provided

Question 1

(a) Visible light is an electromagnetic radiation with a wavelength that is visible to the eye.
There are two main sources of light which are as follows. With appropriate examples,
describe both of them.
   i.   Natural light (Daylight)
   ii. Artificial light

(8 marks)

(b) There are many methods of using passive daylighting technology in a building.
Recommend **FIVE (5)** components or methods that can be implemented in order to use
or harvesting daylights.

(10 marks)

(c) Glaze and heat are two common problems associated with the quality performance of
daylighting. In order to provide the best lighting design which meet the user
requirements and at the same time increase energy savings in the buildings,
improvements should be implemented. Identify **THREE (3)** methods to overcome
future daylighting problems.

(7 marks)

Question 2

(a) Light fixtures can be classified according to the light function, lamp type, installation
method and the percentage of light output above and below the horizontal. Briefly
describe **FIVE (5)** types of light fixtures according to the following functions:
   i.   Ambient (General Lighting)
   ii. Task
   iii. Accent

    iv.   Informational Lighting/Guidance Lighting

    v.   Decorative Lighting

(10 marks)

(b)   A 14 ft by 18 ft kitchen with 8 ft high ceilings will have an ambient lighting target illuminance of 50 fc at cabinet countertops (the work plane) that are 36 in above the floor. It is anticipated that the ceiling reflectance is 0.70 and the average wall reflectance is about 0.1. The space will be illuminated with open reflector recessed downlight luminaire with one vertically mounted lamp, as shown in Figure 1. The initial output of the 39 W compact fluorescent lamps is 2850 lumen. The light loss factor will be assumed to be 0.70. Neglecting the spacing criteria, determine the minimum number of luminaires required to provide uniform illumination in the space.
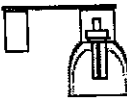
(15 marks)

1 Compact Fluorescent Lamp	Spacing Criteria (CS)	Reflectance	Coefficient of Utilization (CU)											
		Ceiling Cavity (ρcc)	80			70			50			30		
		Wall Surfaces (ρw)	50	30	10	50	30	10	50	30	10	50	30	10
		Cavity Ratio (CR)												
	0.8	10	.42	.38	.36	.42	.38	.36	.41	.38	.36	.41	.38	.35
		9	.45	.41	.38	.45	.41	.38	.44	.41	.38	.44	.40	.38
		8	.48	.44	.42	.48	.44	.41	.47	.44	.41	.46	.43	.41
		7	.51	.48	.45	.51	.47	.45	.50	.47	.45	.49	.46	.44
		6	.55	.51	.49	.54	.51	.48	.53	.50	.48	.53	.50	.48
		5	.59	.55	.52	.58	.54	.52	.57	.54	.51	.56	.53	.51
		4	.62	.59	.56	.62	.59	.56	.60	.57	.55	.62	.60	.58
		3	.66	.63	.61	.65	.63	.60	.64	.61	.59	.62	.60	.58
		2	.71	.68	.66	.70	.67	.65	.67	.66	.64	.66	.64	.63
		1	.75	.74	.73	.74	.73	.71	.71	.70	.69	.89	.68	.67

Figure 1: Coefficients of utilization for open reflector recessed downlight luminaire with one vertically mounted lamp

Question 3

(a)   There are two types of Light Loss Factor (LLF); Recoverable and Non-Recoverable. Total Light Loss Factor (LLF) is the product of the individual light loss factors, recoverable and non- recoverable. Distinguish every sub-factors of the Recoverable LLF as follows:

    i.   Lamp Lumen Depreciation (LLD)

    ii.   Lamp Burnout Factor (LBO)

    iii.   Luminaire Dirt Depreciation Factor (LDD)

    iv.   Room Surface Dirt Depreciation Factor (RSDD)

    v.   Area of Work Plane (AWP)

(10 marks)

(b)   Lighting control systems are employed to maximize the energy savings from the lighting system, to satisfy building codes, or to comply with green building and energy conservation programs. Briefly discuss the following lighting control methods:

    i.   Manual light reduction

    ii.   Occupancy sensing

    iii.   Scheduling

    iv.   Daylight harvesting

(8 marks)

(c)   Lighting is provided so that people can perform visual tasks. Visual quality can be affected by several factors such as color rendition and color temperature. Compare these two factors.

(7 marks)

Question 4

(a)   Explain **FOUR (4)** types of light pollution.

(8 marks)

(b)   Light pollution is excessive and inappropriate artificial light. Recommend **FIVE (5)** benefits of using recommended minimum lights level.

(10 marks)

(c)   Identify **FOUR (4)** consequences of light pollution to human health and environment.

(7 marks)

Question 5

(a)   Figure 2 below shows an illustration of an Intelligent Factory Lighting. With appropriate elaboration, explain all **THREE (3)** features in the diagram.
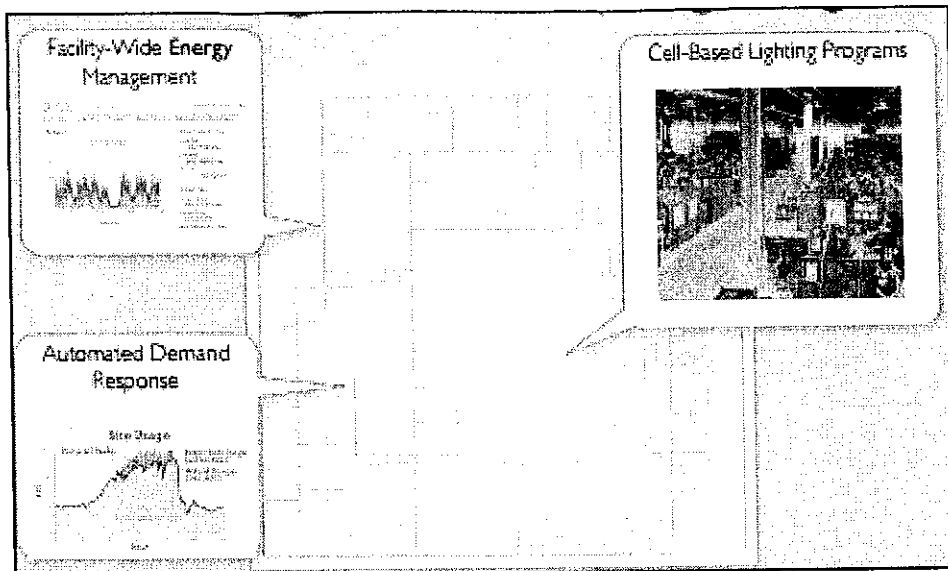
(15 marks)

Figure 2: Intelligent Factory Lighting

(b)   Daylight harvesting systems use daylight to offset the amount of electric lighting needed to properly light a space, in order to reduce energy consumption. With the aid of illustration, describe the operation principles of the following daylight harvesting applications:

i.   Roof Light Through
ii.   Light Reflector/Shelve

(10 marks)

END OF EXAMINATION PAPER