UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF INDUSTRIAL TECHNOLOGY

FINAL EXAMINATION

JANUARY 2016 SEMESTER

COURSE CODE	:	JFB 30603
COURSE TITLE	:	MECHANICAL AND ELECTRICAL BUILDING MAINTENANCE
PROGRAMME LEVEL	:	BACHELOR
DATE	:	23 MAY 2016
TIME	:	9.00 AM – 12.00 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 5 PAGES OF QUESTIONS EXCLUDING THIS PAGE.

Total: 100 marks

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

Question 1

(a) Define building maintenance.

(2 marks)

(b) Preventative maintenance is maintenance that is regularly performed on a piece of equipment or building to lessen the likelihood of it failing. The maintenance is usually scheduled based on certain indicators. Explain **TWO (2)** of the indicators and provide an example for each.

(8 marks)

(c) Magnetism is a force of attraction between ferromagnetic metals and a force of repulsion between diamagnetic materials while electricity is a form of energy tied to the existence of electrical charge. A strong link exists between electricity and a magnetic field. Relate between magnetism and electricity.

(7 marks)

(d) A circulating pump consumes 450 W for 24 hours a day. Evaluate the following:

i. Energy consumed for a one-year period.
ii. The utility energy charges for this period at a rate of RM0.38/kWh.
iii. The energy saved for a one-year period, if the pump is switched off 8 hours a day.
iv. Calculate the energy cost savings for this period at a rate of RM0.38/kWh, if the pump is switched off 8 hours a day.

(8 marks)

Question 2

(a) An electrical device is a component in an electrical system that is designed to carry but not use electricity. This includes components such as switches, receptacles, and plugs. Differentiate between a receptacle and plug-in building electrical systems.

(8 marks)

(b) Describe the following terminologies:

i. Lumen output (LM)

ii. Light Loss Factor (LLF)

iii. Coefficient of Utilization (CU)

(9 marks)

(c) A 100 ft by 140 ft conference center lobby area will have luminaires for ambient lighting hung 48 ft above the floor. The ceiling cavity reflectance is 0.80 and the average wall reflectance is about 0.30. The space will be illuminated with high-bay, intermediate-distribution, reflector luminaires as shown in Figure 1. 400 W clear metal halide lamps with an initial output of 36 000 lm will be used. The target illuminance is 50 fc at the floor plane. The LLF will be assumed to be 0.60. Justify the number of luminaires required to provide uniform illumination in the space.

(8 marks)

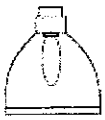
High Bay Intermediate-Distribution Reflector HID Luminaire													
		Reflectance	Coefficient of Utilization (CU)										
	Spacing Criteria (CS)	Ceiling Cavity (ρ_{cc})	80			50			30			10	
1 HID Lamp		Wall Surfaces (ρ_w)	50	30	10	50	30	10	50	30	10	50	30	10
		Cavity Ratio (CR)												
	1.0	10	.38	.33	.29	.37	.32	.29	.36	.32	.29	.35	.31	.28
		9	.41	.36	.31	.40	.35	.32	.39	.35	.32	.38	.35	.32
		8	.45	.40	.36	.44	.39	.36	.43	.39	.35	.46	.42	.39
		7	.50	.44	.45	.62	.48	.45	.51	.47	.44	.50	.47	.44
		6	.54	.49	.45	.52	.46	.45	.51	.47	.44	.50	.47	.44
		5	.59	.54	.50	.57	.53	.50	.56	.52	.49	.54	.51	.48
		4	.65	.60	.56	.62	.58	.55	.60	.57	.54	.59	.56	.54
		3	.71	.66	.63	.67	.64	.61	.65	.62	.60	.63	.61	.59
		2	.77	.73	.70	.73	.70	.68	.70	.68	.66	.68	.66	.65
		1	.84	.81	.79	.79	.77	.76	.76	.74	.73	.73	.72	.71
		0	.91	.91	.91	.84	.84	.84	.81	.91	.81	.77	.77	.77

Figure 1: Coefficients of utilization for High Bay Intermediate-Distribution Reflector HID Luminaire.

Question 3

(a) Electronic security systems have been used extensively in residences, commercial, industrial and institutional buildings. Discuss **FOUR (4)** types of electronic devices that can be installed to provide building security.

(8 marks)

(b) Passive fire protection in buildings involves constructing walls, floors, ceilings, beams, columns, and shaft enclosures so they can resist, control, and contain the damaging

effects of a fire. Explain **THREE (3)** application examples of passive fire protection in buildings.

(9 marks)

(c) Generally, sprinklers can be categorized into two types, automatic and conventional sprinkler fire suppression systems. Analyze the following conventional sprinkler systems:

i. Wet-Pipe Automatic Sprinkler Systems
ii. Dry-Pipe Automatic Sprinkler Systems
iii. Pre-action Automatic Sprinkler Systems
iv. Deluge Automatic Sprinkler Systems

(8 marks)

Question 4

(a) An elevator is a conveying device used to move people or freight vertically, usually between floors of a building. Figure 2 shows two basic types of elevator technologies. Differentiate between these two types.

(8 marks)

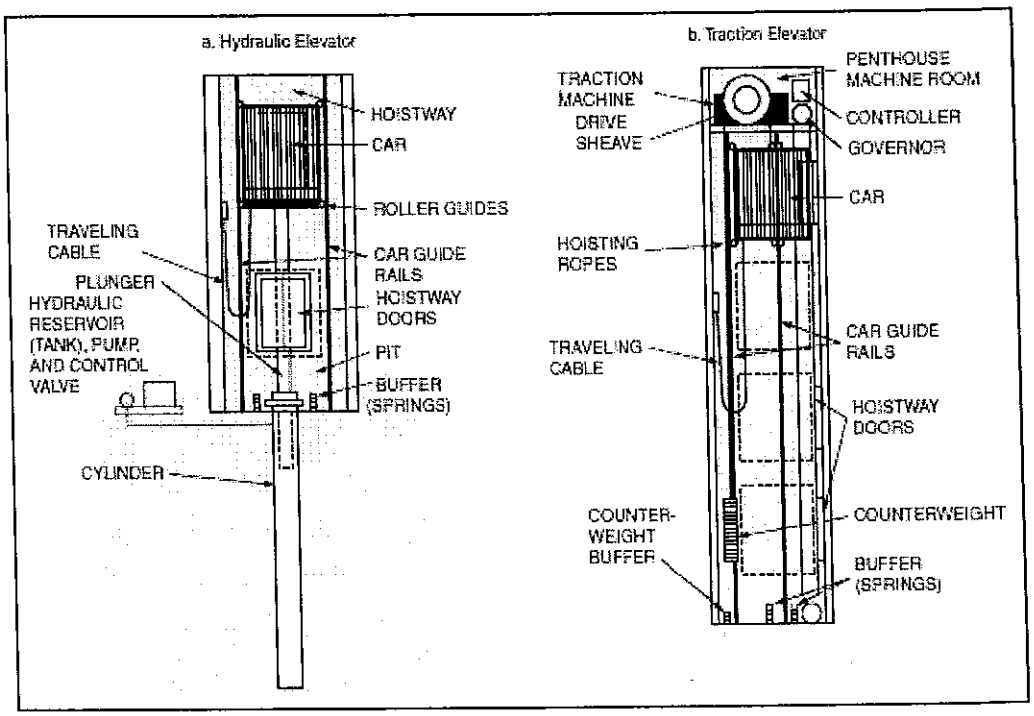


Figure 2: Basic types of elevator

(b) Describe the following components of an escalator system:

i. Drive unit
ii. Sprocket drive
iii. Steps
iv. Balustrade
v. Moving handrail
vi. Truss

(12 marks)

(c) Differentiate between a soil stack and a waste stack.

(5 marks)

Question 5

(a) Assess the following storm sewers systems and suggest the appropriate conditions should these systems be used.

i. Private Storm Sewers
ii. Combined Community Sewers
iii. Separate Community Storm Sewers

(9 marks)

(b) A sustainable building, also known as a green building is a healthier and more resource-efficient structure that is designed, built, operated, renovated, reused, and eventually demolished in a sustainable manner. It is designed to meet specific goals such as protecting occupant health, improving employee productivity, using energy, water and other resources efficiently and reducing the overall impact to the environment.

Propose in detail one approach for each of the sustainable building principles listed below:

- Incorporate energy-conserving methods and strategies that complement the local climate in design and construction of the building envelope.
- Use locally produced, environmentally preferable building materials effectively.

- Use renewable energy sources where effective.
- Avoid use of energy-intensive, environmentally damaging, waste-producing, and/or hazardous materials

(16 marks)

END OF EXAMINATION PAPER