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Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION

SEMESTER II

SESSION 2023/2024

COURSE NAME : BUILDING ELECTRICAL SYSTEM
MAINTENANCE

COURSE CODE : BBJ 20705

PROGRAMME CODE : BBJ

EXAMINATION DATE : JULY 2024

DURATION : 2 HOURS 30 MINUTES

INSTRUCTIONS :

1. ANSWER ALL QUESTIONS
2. THIS FINAL EXAMINATION IS CONDUCTED VIA
 Open book
 Closed book
3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED

THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

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Q1 (a) List **two (2)** classes of Miniature Circuit Breaker (MCB)

(2 marks)

(b) As an electrical technologist, you are tasked to design electrical systems for a laboratory at UTTH University. The detailed loads for the laboratory are in **Table Q1(b)**. In accordance with the JKR design guideline, the diversity factors (DF) for lighting, socket outlets, motor, and air conditioning are set at 0.8, 0.6, 1, and 1, respectively.

Table Q1.1 A detailed loads for the laboratory

Load	Rating	Qty.
LED lighting	2 × 20 W	14
Socket outlet	13 A	12
Air conditioning	1 Hp	3
Air conditioning (inverter)	2.5 Hp	5
3-phase motor connected to Variable Frequency Drive (VFD)	5 Hp	1
VFD	5 Hp; Rated output current = 8.8 A	1

(i) Choose an MCCB size for the laboratory. Note that the MCCB nominal ratings available in the market are 40 A, 50 A, 63 A, 80 A, 100 A, 125 A, and 160 A.

(5 marks)

(ii) Select RCCB and MCB sizes for the laboratory. Note that the RCCB nominal ratings available in the market are 40 A, 63 A, and 100 A.

(5 marks)

(iii) Sketch a single-line diagram (SLD) for the DB circuit based on your answer in **Q1(b)(ii)**.

(5 marks)

(iv) Determine the sizing of the main MCCB to be installed in the sub-switchboard (SSB) for the building if we have four identical laboratories.

(8 marks)

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- Q2** (a) List **three (3)** cable types for structured cabling systems in buildings. (3 marks)
- (b) Discuss the differences between an interruption and sags of power quality. (6 marks)
- (c) Discuss the network topologies of the bus and ring with the aid of a diagram. (8 marks)
- (d) With the aid of a suitable diagram, discuss the operation of the fire alarm system. (8 marks)
- Q3** (a) List **five (5)** KNX devices for basic application. (5 marks)
- (b) Briefly explain the individual address in KNX. (4 marks)
- (c) Draw a wiring diagram of a complete KNX system in a building for controlling two dimmable lamps. (7 marks)
- (d) Program the KNX system using the ETS platform based on the given specification in Figure Q3.1. (9 marks)

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- Q4** (a) State **four (4)** types of preventive maintenance. (4 marks)
- (b) Briefly explain **two (2)** advantages of preventive maintenance. (4 marks)
- (c) Draw a flow chart of the procedures to perform preventive maintenance for the commercial building's switchboard/distribution board (DB). (9 marks)
- (d) Discuss procedures to execute preventive maintenance for the building's lightning protection system (LPS). (8 marks)

- END OF QUESTIONS -

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APPENDIX A

Building Parts

Building Name : Miss M HOUSE

Building Parts : Room – Dining Room
 – Living Room
 – Kitchen
 – Deck
 Cabinet – KNX-DB (In Dining Room)

Topology :

1 line connection - 1.1._

KNX System Component

Function : TOGGLE/SWITCH

NO	COMPONENT
1	Power Supply
2	8 fold switch actuator
3	2 gang push button
4	USB interface

PUSHBUTTON	LOAD	FUNCTION
Push Button 1	LIVING + DECK	Toggle
Push Button 2	KITCHEN + DINING	Toggle
Push Button 3	ALL LIGHT	OFF
Push Button 4	ALL LIGHT	ON

Group Address Structure :

Main Group : Level 0
 Middle Group : Lighting
 Group Addresses : As per load

Figure Q3.1 Specification for ETS program.

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