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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2018/2019**

COURSE NAME : BUILDING MAINTENANCE
COURSE CODE : BFB 40903
PROGRAMME CODE : BFF
EXAMINATION DATE : DECEMBER 2018/JANUARY 2019
DURATION : 3 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF **NINE (9)** PAGES

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Q1 The conservation of historic buildings is to preserve a heritage structure through restoration and maintenance works. Maintenance has been identified as a key intervention in protecting historic structure by prolonging a building lifespan.

(a) Based on the guidelines made by the National Heritage Department, interpret with suitable example the principle of conservation works for roof structure of heritage building.

(7 marks)

(b) State with example **TWO (2)** types of investigation and experiment for identifying original materials used in historic building in addition to knowing the durability of building materials.

(3 marks)

Q2 The building inspection is performed to assess the building's condition. This inspection system will give the level of diagnostics to building problems and will be referred to the Forensic Expert Branch for proposing proper repair solutions.

(a) Interpret the scale used to describe the level of physical condition of building components based on the Guideline for Inspection and Assessment of Building Condition, JKR 21602.

(5 marks)

(b) Prepare **FIVE (5)** examples of damage or defects commonly identified during building inspection for institutional building which has been occupied more than 25 years using Inspection Form, JKR 21602 complete with rating score and action matrix.

(15 marks)

Q3 As a building maintenance consultant engineer, you need to advise your prospective client on the life cycle cost analysis of building services components. The client is considering to replace existing heating heating system with a new one. The details information of the system are presented in **TABLE 1**. Evaluate which type of equipment is economical to be used.

(10 marks)

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Q4 Three types of roofing system are proposed to be used in a new mosque building construction in Parit Raja, Batu Pahat, Johore. Evaluate the comparative life cycle cost (LCC) of the roof systems, using the data provided in **TABLE 2**. The discount rate is assumed to be 4.75% and lifespan is 30 years. The cost is calculated based on 100 square feet. Justify which type of roofing system is economical to be used.

(10 marks)

Q5 (a) A building defects inspection of a new building is necessary to be carried out within the Defects Liability Period. During the period, the contractor remains liable under the building contract for dealing with any defects which become apparent. Based on your understanding, explain with an example, type of defect liability period and how it can be rectified.

(6 marks)

(b) Building inspection is executed to determine the damage and defects in the building and to provide the necessary repair work. Based on **FIGURE 1**, generalize the types of defect occurred, causes and appropriate remedies.

(10 marks)

Q6 (a) Supervision is an assignment given to those qualified persons to ensure the implementation of work is done properly in accordance with the standards and procedures. Propose and explain a flow chart of the supervision process to monitor the maintenance works executed by the maintenance contractor for the Maintenance and Repair Works of Surau and Other Works Related at Taman Senggarang Jaya, Batu Pahat, Johore.

(10 marks)

(b) Scheduled maintenance is a list of predetermined maintenance actions to be carried out at regular time intervals aiming at the prevention of breakdowns. The aim of scheduled maintenance is to prevent equipment failure before it actually occurs. Based on your understanding and fieldwork experience, develop maintenance planning for the scheduled maintenance for the following works;

(i) Cold Water Tank

(5 marks)

(ii) Timber Structure

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(5 marks)

- Q7** (a) Quotation is a method of procurement that can be implemented by the clients. It can be used in procuring of supplies, services or works. Based on the quotation provided in **TABLE 3**, identify **FIVE (5)** important information to be stated in the quotation. (5 marks)
- (b) Generally in all construction projects, variation of works are common occurrences during construction phases. Based on your understanding, explain with example the situation when the variation of works would occur in the building maintenance works. (2 marks)
- (c) Calculate the payable amount to the contractor for maintenance works based on the **TABLE 4**. The project is the Community Centre building at Parit Raja which is 21.6 km from the PWD Batu Pahat District office, Johore. The repair works is to change the damages of 5 nos of existing flush doors with new solid doors and 65 nos damages of roof tiles with new standard roofing tiles. (7 marks)

– END OF QUESTIONS –

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TABLE 1

Cost Element	Heater System A (RM)	Heater System B (RM)
Initial Cost		
• Boiler	170,000	135,000
• Pipework an units	50,000	45,000
• Insulation	15,500	35,000
Repairing cost	5,000 per annum	3,000 per annum
Replacement cost	30,500 every 10 years	35,000 every 25 years
Overhaul cost	10,000 every 5 years	10,000 every 10 years
Fuel and utilities cost	8,000 per annum	7,500 per annum
Discount rate	4.85%	4.85%
Life span	50 years	50 years

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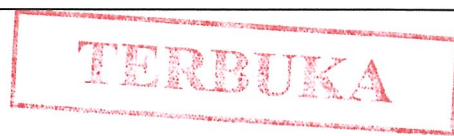
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TABLE 2

Cost Element	Flat Roof (RM)	Pitch Roof (RM)	Dome Roof (RM)
Installation cost	700	1,200	2,200
Operation and maintenance cost	200 per annum	400	500
Replacement cost	600 every 15 years	-	-
Discount cost	4.75%	4.75%	4.75%
Life span	30 years	30 years	30 years



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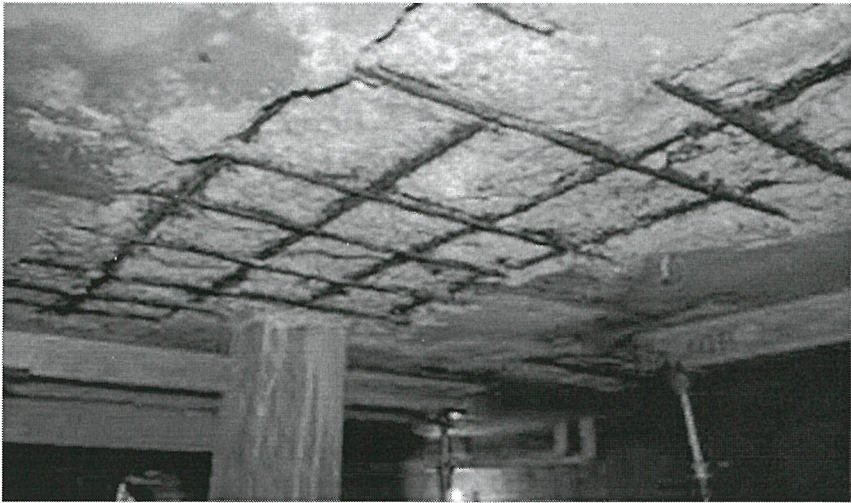
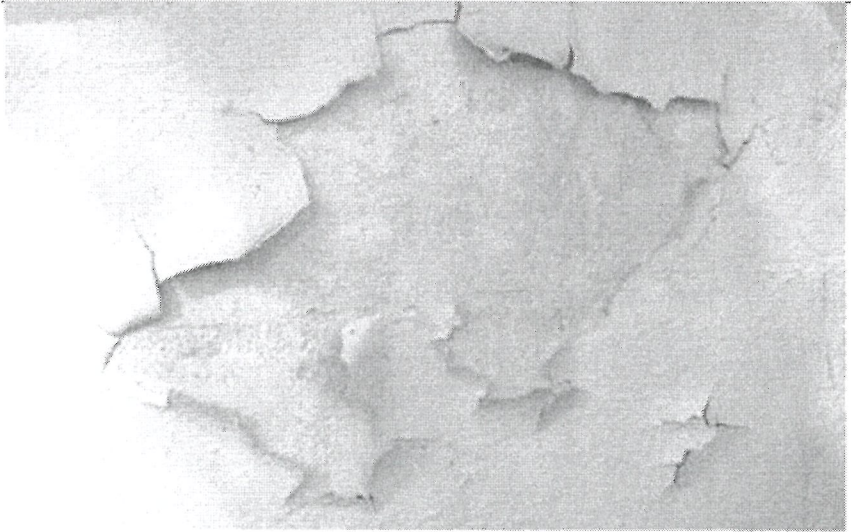
<p>Defect 1</p>	
<p>Defect 2</p>	

FIGURE 1

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TABLE 3

Client	Public Work Department
Quotation No.	JKR/WP/Q/77/2018
Project Title	Maintenance and Replacement of Roof Gutter and Other Works Related to Basement Parking Area at Complex D, Central Administration of The Federal Government, Presint 1, Putrajaya.

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TABLE 4

No	Description	Rate
1	Replace and remove any type and thickness of existing door including hinges and lockset	RM 8.00/ no
2	Supply and install new solid door type including hinges and lockset	RM 285.00/ no
3	Opening and removing damaged roof tiles	RM 10.00/ no
4	Supply and install new standard roofing tiles	RM 4.80/ no
5	Additional factor for location	
	-less than 15km	10%
	-15 – 30km	17%
	-30 – 50km	20%

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